December 10, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1862

TECHNOLOGY DEPT.

PUBLIC LIBRARY
DEC 10 1945
DETROIT

New HOLDEN PROCESSES
for Immediate Savings . .

SPEED NITRIDING
Controls distortion
maximum hardness

DESCALING
Removes Forging
or
Normalizing Scale

BRIGHT TEMPERING
Speeds
Plating

EACH HOLDEN PRODUCT has been field tested for more than one year; proven results are available to you either by testing Holden Baths in your own heat treating department or tests by our Research Department.

FLOW or ISOTHERMAL HEAT TREATING
Bright hardened parts
No temper oxide

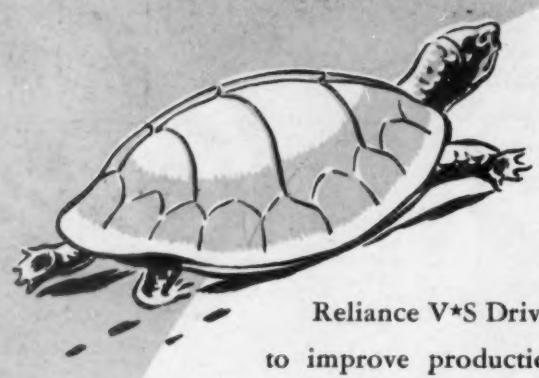
MARTEMPERING
Minimum distortion
maximum hardness

WIRE PATENTING
From furnace
to draw bench!

Use this key to new profits • Our Engineers will work with you.

RESEARCH, HEAT TREATING BATHS and FURNACES
Coordinated for Quality and Efficiency

THE A. F. HOLDEN COMPANY
Metallurgical Engineers Heat Treating Baths and Furnaces for 300° F. to 2350° F.
ain Office and Factory: NEW HAVEN 8, CONN. Warehouses: DETROIT, CHICAGO, LOS ANGELES
OLDEN PRODUCTS are manufactured in Canada by PEACOCK BROTHERS, LTD., MONTREAL



INCHING

Reliance V★S Drive helps to improve production and cut costs by providing extremely slow speed for inching, threading and close inspection of work in process. In addition, it can furnish smooth, controlled acceleration—automatic reversing and quick stopping—control of tension—adaptability to almost any type of production machinery or processing operation. With its greater flexibility and ease of control, V★S Drive reduces operator fatigue—helps keep production high all day long.

V★S is an *all*-electric, adjustable-speed drive, operating from A-c. circuits, and, as indicated below, it is available as either a rotating or electronic system in a wide range of horsepowers. Write for Bulletin 311, or call the nearest Reliance office for recommendations as to the proper type of V★S Drive for your requirements.

RELIANCE ELECTRIC & ENGINEERING COMPANY

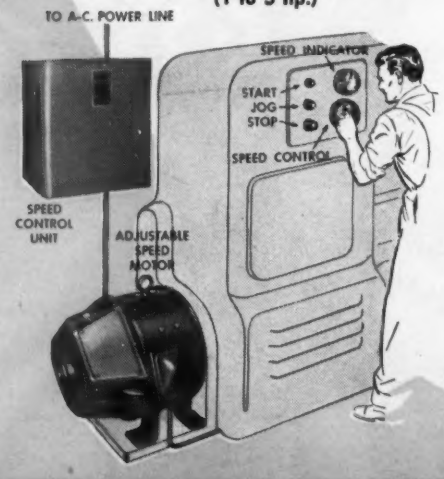
1081 Ivanhoe Road • Cleveland 10, Ohio

Birmingham • Boston • Buffalo • Chicago • Cincinnati • Denver • Detroit • Gary • Greenville • Houston
Kalamazoo • Kansas City • Knoxville • Los Angeles • Milwaukee • Minneapolis • New Orleans • New York
Philadelphia • Pittsburgh • Portland, Ore. • Rockford, Ill. • St. Louis • San Francisco • Seattle • Syracuse
Tampa • Washington, D. C.

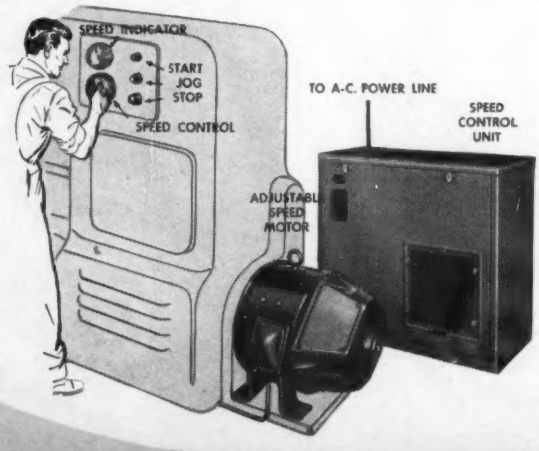
RELIANCE V★S DRIVE

AN *ALL-ELECTRIC, ADJUSTABLE-SPEED DRIVE* for A-c. Circuits

ELECTRONIC SYSTEM
(1 to 5 hp.)



ROTATING SYSTEM
(1 to 200 hp.)



RELIANCE A-C D-C MOTORS

"Motor-Drive is More Than Power"

AT BETHLEHEM IT'S *Steel* PLUS *Service*

An important division of Bethlehem's business is the making of high-grade carbon and alloy steels for every purpose. But it has always seemed to us that the proper handling and treatment of steel is as vital as the quality of the product itself.

To that end, Bethlehem offers the services of its technicians on problems involving analyses, heat-treating, and applications. It is a common thing for Bethlehem "trouble-shooters" to visit customers' plants, suggest the proper alloy for a given job, and discuss questions of hardenability, grain size, machining, etc.

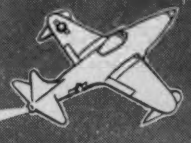
During the war years, this service was accelerated in the interests of victory. The net result was two-fold: (1) a speed-up of production in many, many instances; (2) a fund of experience that is enabling our metallurgists to render even greater help during this reconversion era.

Bethlehem's customer relations are by no means confined to the sale of steel. If you have a problem that relates to steel, why not get in touch with us? You'll find that we offer both steel *and* service.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Bethlehem Steel Export Corp., New York

★ BETHLEHEM STEEL ★

JET PROPULSION TURBINES by BROACHING



Step 1

WAR PRODUCTION, with its emphasis on speed and precision, proved beyond a doubt the unequalled speed and accuracy of broaching. For example, the typical wartime problem shown below was the exact shaping of slots in jet propulsion turbines. Broaching by *American* delivered the turbines much faster than would have been possible by any other method.

Likewise, in today's competitive market, broaching by *American* can turn out your products speedily, economically, and accurately. Let *American's* complete broaching service—machines, tools, and engineering —help solve your manufacturing problems. Write today for details.

An *American* HD-15-66 Horizontal Broaching Machine (below) was used to broach starting slots in jet propulsion turbine wheels. Employing a set of two broaches, two cuts were made with the first, and one cut with the second — the second broach deepening one of the slots already cut with the first broach. The result of these three cuts is illustrated by the silhouette above.

WATCH THIS PAPER for the next operation in broaching jet propulsion turbines. Step 2—Semi-Finishing—will be described in American's February 4th advertisement.

MEMBER BROACHING TOOL INSTITUTE

American

BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF SUNDSTRAND MACHINE TOOL CO.

Milling Cutters
General recommendations can be given for Macklin specifications of wheels used to sharpen Milling cutter. There are, however, many kinds of milling cutters and many variants to be considered such as type of machine, condition of machine, type of material, area of contact, etc.
Courtesy of Ingersoll Milling Machine Co.
Grinding face milling cutter with straight wheel.
Most milling cutters are ground on universal tool and cutter grinders. Many attachments are available for these machines so that they can be used for different types of jobs. In some cases one general purpose wheel may suit the needs but a specific Macklin wheel is available for any particular job.
Courtesy of Ingersoll Milling Machine Co.
Straight wheel grinding radius end mill.
Two general methods are used in grinding the clearance of milling cutters. Spiral, straight and side milling cutters, face mills, side milling cutters and end mills are sharpened by grinding the clearance — on the periphery at an angle behind the cutting edge. Formed or relieved cutters are sharpened by grinding the front faces of their teeth so that the right shape and profile are retained.
Cup wheel sharpening end mill.
21
Courtesy of Brown & Sharpe Mfg. Co.
Cup wheel grinding periphery of teeth of large face milling cutter.
Milling cutters should be kept in good sharpened condition to give maximum efficiency. If allowed to become dull they will produce ragged and unsatisfactory finish. If resharpened often it is only necessary to grind small amounts from cutter to maintain sharp teeth. In the long run it is less costly and more efficient.
RECOMMENDATIONS
Sharpening (Straight wheel) ..... 48 A 46 K 5 V 6 Alum. Vit.
Ingersoll (Type 4) ..... 48 A 46 J 5 V 6 Alum. Vit.
29 A 36 N 7 B 4 Alum. Res.
Cups & Dish ..... 48 A 46 J 5 V 6 Alum. Vit.
48 A 60 J 5 V 6 Alum. Vit.
It is a good idea to ask the advice of an experienced grinding wheel man to assure the selection of the correct wheel for any sharpening job. Maximum efficiency will then be obtained and tools will last longer.
Grinding inserted tooth milling cutter with cup wheel.
22
FOR TOOL ROOM SURFACE JOBS
A NEW BOND for better results
MACKLIN
TOOL ROOM WHEELS

Write for this T-45 Booklet giving complete information on how to use the new V5 and V6 bonds for tool room grinding. Included in the booklet are wheel recommendations for all types of tool room grinding. Ask for sufficient copies to serve your organization.

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

BEHIND THE SCENES

Staff Activities

■ We've been prowling around up on the ninth floor, which in less active times might properly be called the ivory tower of the editors. These days we never seem to find any editors inhabiting their towers. In fact, they are harder to locate than good Scotch whisky. By using some subterfuges known only to the clan Shrdlu, we were able to latch on to an editor the other day so as a result, we can let you in one some of the stuff they've been doing. Guy Hubbard, Machine Tool Editor, who has been in New York, reports the hotel situation is getting no better fast. However, he made out all right. He slept for two nights on a cot in the manager's office of the hotel where he had reservations. It wasn't so bad sleeping, he says, but they woke him up early every morning so they could move his cot out and replace the chair at the secretary's desk in time for her to go to work. He was lucky, though, because some of the less fortunate had to sleep in lobby chairs every night.

George Birdsall, our prolific associate editor, has been in Milwaukee, Minneapolis and Cincinnati digging up a batch of new material for his excellent articles on metalworking, and you'll be seeing some of them in the weeks to come. Engineering Editor Irwin Such, generally referred to as "Pinky", has been busily engaged in framing the Yearbook of Industry issue, which, as we reported here last week, will probably mark a new milestone in industrial publishing. In this little project, he is being aided by most of the rest of the staff, the U. S. Census Bureau, and several thousand metalworking executives who have proved most helpful and cooperative in answering the questions propounded by the editors.

One Hundred-Fifty Years of Steel

■ The year is almost over and we haven't paused to note an interesting and important milestone. It all started when G. Washington was president of the infant republic and the newly-won freedom was being enjoyed by the erstwhile colonists. In 1795 at Burnham, Pa., a group of early American craftsmen established "Freedom Forge" to provide metal parts for the neophyte industries which were to develop into the world's greatest industrial power. Today this plant is still operating, grown, merged and developed into the Standard Steel Works division of Baldwin Locomotive Works. In 150 years the plant has changed names several times, but it still operates in the same location and still makes steel products for industry.

California Labors

■ The State of California recently looked into the problem of unemployment and came out with some facts which looked interesting to us. They found out among other things why a lot of California workers have ceased being workers and are now "out of the labor force". It seems they:

Left to have babies
Went back to school
Died
Retired
Earned enough to buy a fur coat and went back to housekeeping
Went home to New York
Went fishing
Got married and quit.

California weather, too, must be a cause of unemployment, because among the causes discovered by the study were:

A flood washed away two hamburger stands.
Temperature dropped, and the summer hotels closed.
It rained, and roadbuilding work was stopped till next year.

Looks like the state and the Los Angeles Chamber of Commerce ought to get together on these things.

Almost 100% Reconverted

■ The advertisers in our pages are practically 100 per cent reconverted. We made a quick check in last week's book and located only seven ads which even mentioned the war, and of these, all but two were talking about postwar uses of wartime developments. If all factors were as easy to reconvert as the advertising, wouldn't it be a rosy-pink world?

Miles and Miles of Files

■ The CPA, which is the successor to WPB and its forebears, is having a sweet time finding out what to do with the unbelievable amount of statistical information it has inherited. There are about 7500 tons of records involved. That's a lot of paper. It's about ten times as much paper as the Penton Publishing Co. uses in a year to publish STEEL and its sister publications. Included in this mass of numbers is a lot of valuable data, but the CPA doesn't quite know what to do about it. They've set up a room where businessmen can go and study the available material, so if your business might benefit from figures on markets, production capacity and the like, you'll probably find what you want in their catalog of statistics.

Yes and No, But No Action

■ We rather liked a little note which Workman Service, Chicago, put in its monthly magazine, so we quote, "Mister, you've been reading us . . . you've been nodding your head up and down, up and down, or this way and that way, but . . . you haven't called us . . . and we've missed you." All of which is followed by an advertising message designed to point out the advantages of Workman Service.

Add Aluminum

■ If you're interested in aluminum fabrication, watch for three new articles which will be published next week and the week following on Lubrication in Deep Drawing Aluminum, Stretch-Forming of Aluminum, and the Stresscoat Process Applied to Aluminum. They're important contributions to the art of fabricating aluminum sheet, and contain information which will help you carve a few bucks off your costs.

SHRDLU

Vol. 117, No. 24, December 10, 1945, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 77

The Problem: SMALL LOT RUNS

The Answer: WARNER & SWASEYS!

RIGHT now, a great many plants are finding production demands changing from long to short runs, with profitable operation more and more dependent on ability to shift equipment quickly from one job to another.

Five factors enter into profitable small run production:

1. Speed and ease of changeover—to keep set-up time low.
2. Flexibility in tooling—to cover the widest range of operations possible with one set-up.
3. Dependability—to hold close tolerances without time-wasting trouble-shooting.
4. Ease of operation—to speed job through.
5. Low maintenance costs—to cut overhead that must be charged against each job.

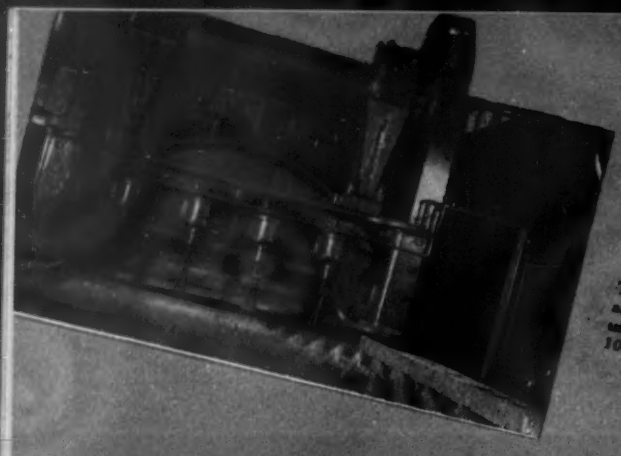
If you'll check up on your own experience with Warner & Swaseys—or the experiences of others—you'll find that they prove to be at or near the head of the list on every one of these five counts!

Why not let a Warner & Swasey Field Engineer show you how the quick adaptability of Warner & Swaseys provides the answer to the problem of maintaining profits in the days ahead. When you plan your equipment investment, look beyond the immediate job in hand—to years of low-cost profitable operation with multi-purpose Warner & Swaseys.

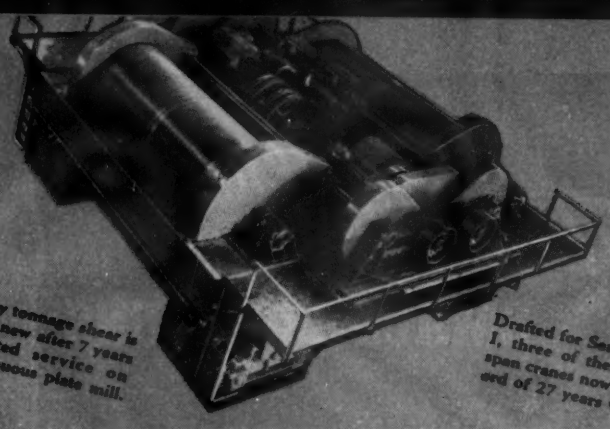
YOU CAN MACHINE IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

TURRET LATHES, SADDLE AND RAM TYPES — CHUCKING AND BAR TOOLS — PRECISION TAPPING AND THREADING MACHINES

WARNER & SWASEY
Machine Tools
Cleveland

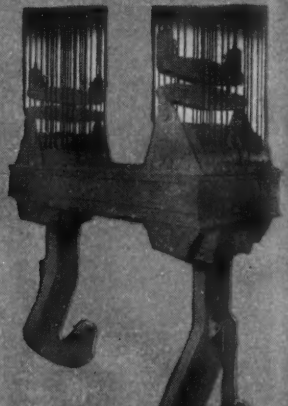


This heavy tonnage shear is as good as new after 7 years uninterrupted service on 100" continuous plate mill.



Drafted for Service in Wo I, three of these 336 ton s span cranes now have a servi ord of 27 years without fail

World's Largest Builder of the World's Largest Cranes



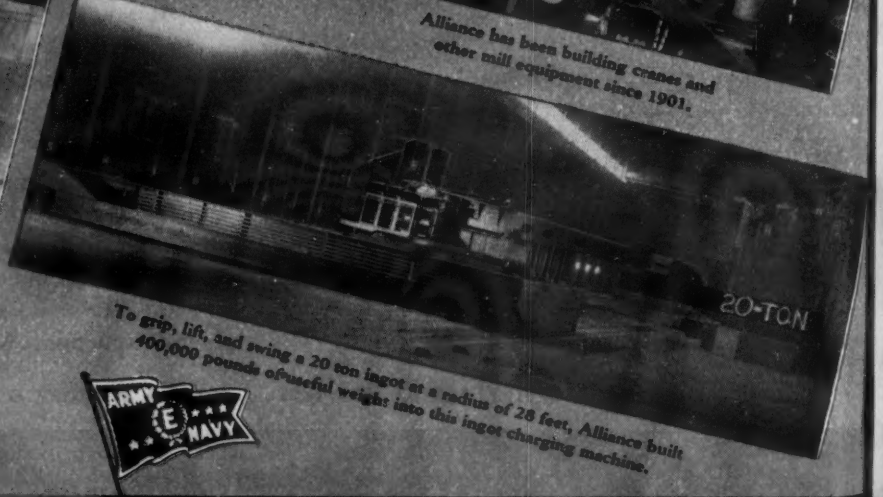
Alliance ladle cranes have an extra safety feature in the method of reeving hoist ropes... an Alliance patent.

ABLE CRANES · GANTRY CRANES ·
CHARGING MANIPULATORS · SOAKING
PIT CRANES · STRIPPER CRANES ·
SLAB AND BILLET CHARGING MACHINES
OPEN HEARTH CHARGING MACHINES

Sixty ton ingots ride to the plate mill in this giant Alliance Ingot Chariot.

Alliance has been building cranes and other mill equipment since 1901.

In addition to multiple range tongs, there are many other features on this new type soaking pit crane.



To grip, lift, and swing a 20 ton ingot at a radius of 28 feet, Alliance built 400,000 pounds of useful weight into this ingot charging machine.

ARMY E NAVY

THE ALLIANCE MACHINE CO.
ALLIANCE, OHIO
PITTSBURGH, PA., OFFICE — 1622 OLIVER BLDG.

Alliance

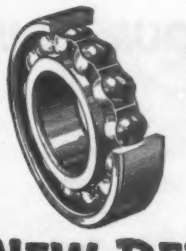
Nothing Rolls Like a Ball . . .

. . . and that fundamental fact has just struck the piano player!

Machine designers, too, have been impressed by that fact. A ball has no ends, needs no artificially fixed axis of rotation. It is nature's favorite, strongest form.

Hence the *ball* bearing. It carries the loads on free-rolling steel balls. It is just *naturally* adapted to our new world of high speeds, heavier loads and ever greater precision.

This is proved by New Departure Ball Bearings in hundreds of millions of applications on land, at sea, in the air—and in every corner of the world.



The engineering experience and meticulous manufacturing methods of New Departure, world's largest maker of ball bearings, can be of great advantage to you.

There is more for you in New Departure Ball Bearings than steel and precision. Advanced engineering and a desire to serve are tangible plus values.

NEW DEPARTURE
BALL BEARINGS

3387

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN. • Branches in DETROIT • CHICAGO • LOS ANGELES and Other Principal Cities

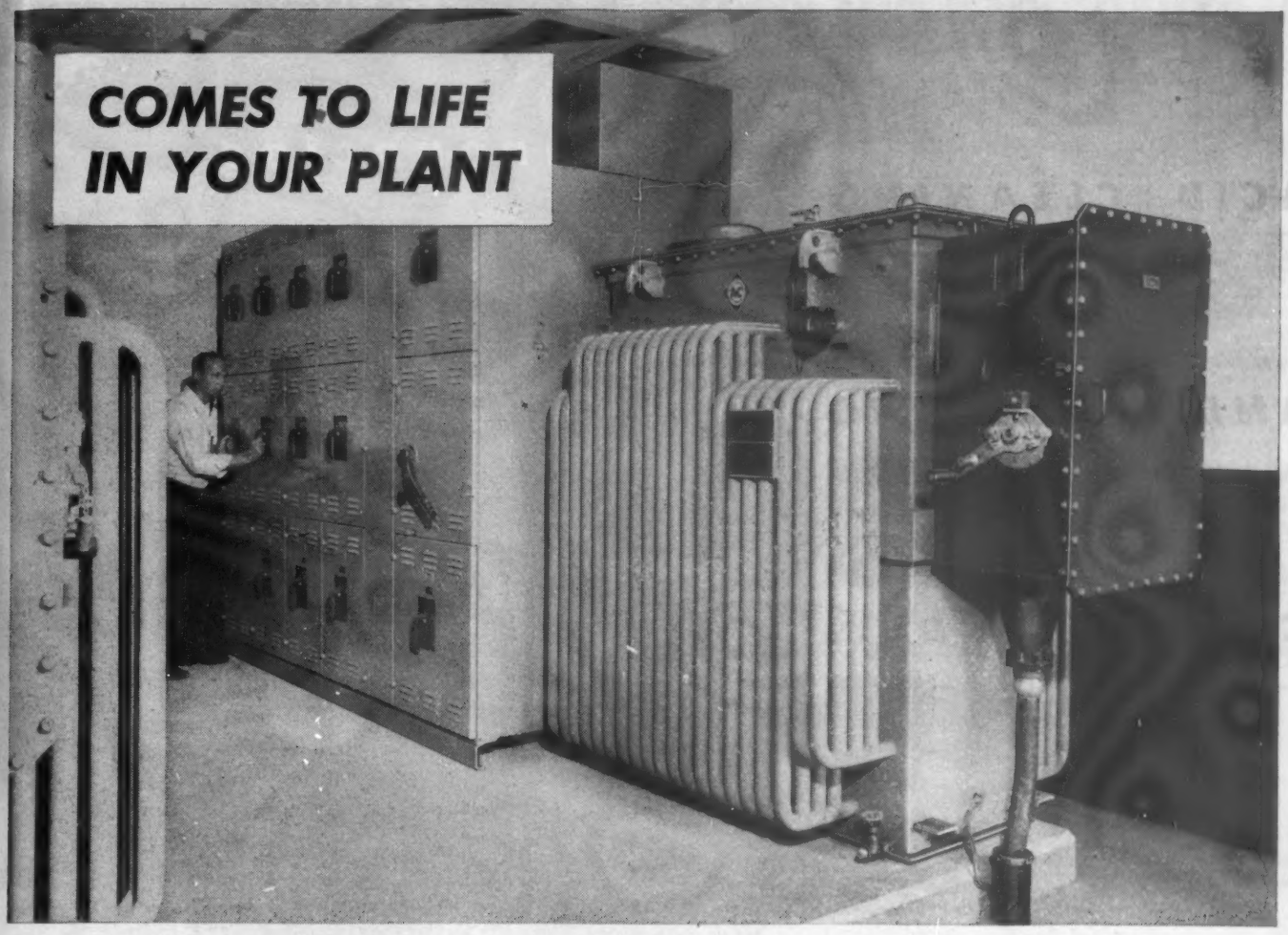
Buy From Sight

SEE WHAT'S AVAILABLE! EXPERIMENT WITH VARIOUS ARRANGEMENTS! MAKE COMPARISONS! BUILD SOLUTIONS! THAT'S THE SIMPLE, IDEA-STIMULATING PROCEDURE WHEN YOU USE ALLIS-CHALMERS' "UNIT SUB BUILDER" SET TO HELP YOU SOLVE YOUR POWER DISTRIBUTION PROBLEMS.

VISUAL PLANNING of your power distribution needs is simple, practical, fast—when you use Allis-Chalmers' "Unit Sub Builder" Set.

With accurate scale models of A-C Prefabricated Load Center Unit Substation apparatus, you see what's available, experiment with various arrangements, make comparisons, build solutions . . . *right on the top of your desk!*

What's more important: A-C models — accurately scaled ½ inch to 1 foot — protect you against costly power distribution mistakes by letting you see what you are getting in terms of dimensions, characteristics, appearance. You make sure that the substation you select is the *right* one for



and Buy Right!

your needs. You pre-test your load center unit sub ideas.

For the last word in visualization, you can have a floor plan of your factory drawn to the same scale as the models. You can build up your unit substation *right where it will stand.*

All of the elements making up Allis-Chalmers unit sub equipment are contained — in miniature — in the model kit. In addition, there's a handy "Unit Sub Slide Rule" to simplify breaker calculation, and a valuable "Unit Sub Check list" to give you the added planning safety of a double check.

This complete *and proven* service is yours with no obligation. To see for yourself how the models, check list, and slide rule can help you in the correct planning of your power distribution system, call your nearby Allis-Chalmers district office.

An A-C field engineer will bring the models, together with the handy slide rule and check list to your office for a showing. There's no obligation, of course. ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WISCONSIN.

A 1948

—with

ALLIS-CHALMERS

Unit Sub Builder Set

ACID CLEANING AND DESCALING COMPOUND...

Announcing

PENNSALT PM-90

VITAL USES:

1. As a pickling bath concentrate in metal finishing shops.
2. As an acid cleaner for removing water scales from feed lines, boilers and a variety of industrial equipment.

MAJOR ADVANTAGES:

1. METAL SURFACE PROTECTION: This carefully manufactured compound is known to give high protection to ferrous metal surfaces. The danger of over-pickling, pitting and high hydrogen absorption will be minimized.

2. REDUCES ACID CONSUMPTION: Compared to an uninhibited acid, Pennsalt PM-90 reduces acid consumption since the acid cleaner is consumed principally in the removal of rust and scale and not in attacking the base metal.

3. IMPROVED WORKING CONDITIONS: Acid fuming is controlled, thus contributing to better working conditions in the plant.

4. CONVENIENCE: Furnished in liquid form . . . can be used either directly from the original container or diluted as much as one part Pennsalt PM-90 to four parts of water. The dilution range will be governed by the speed of cleaning necessary as well as requirements of the particular operation.

PENNSALT PM-90 is packaged in returnable 13 gallon glass carboys containing 115 lb. net. For large consumption, Pennsalt PM-90 is also supplied in tank cars of 4,000 gallons each.

SPECIAL CHEMICALS DIVISION
PENNSYLVANIA SALT MANUFACTURING COMPANY
Dept. S-12, 1000 Widener Building, Philadelphia 7, Pa.

Kindly send me complete information on Pennsalt PM-90

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

SPECIAL CHEMICALS DIVISION
PENNSYLVANIA SALT MANUFACTURING COMPANY
Chemicals
1000 WIDENER BUILDING, PHILADELPHIA 7, PA.
NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • CINCINNATI • MINNEAPOLIS
WYANDOTTE • TACOMA

SPECIAL CHEMICALS DIVISION PRODUCTS
Acid, Alkali, and Solvent-proof Cements · Acid, Alkali and Solvent Emulsion Type Cleaners · Paint Strippers · Pickling Agents · Rust Inhibitor

SNYDER "SPECIAL" BORES, FACES AND TAPS PARTS OF VARIOUS SHAPES, SIZES AND MATERIALS

This two-way Snyder special purpose machine is designed for boring, facing and tapping valve bodies of iron, bronze or aluminum in a wide variety of shapes and sizes.

The part is held in a fixture on a four-station trunnion. The work-holding device locates and clamps through a two-jaw chuck actuated by two hydraulic cylinders for clamping and unclamping.

Side housings each contain two individually-driven and hydraulically fed tool spindles with brackets sliding on hardened and ground ways. Each spindle has a variable speed D.C. motor to obtain maximum efficiency in the tool diameters used. Spindles are adjustable for speed independently through electric rheostats. Hydraulic feed rates are adjustable for each individual slide.

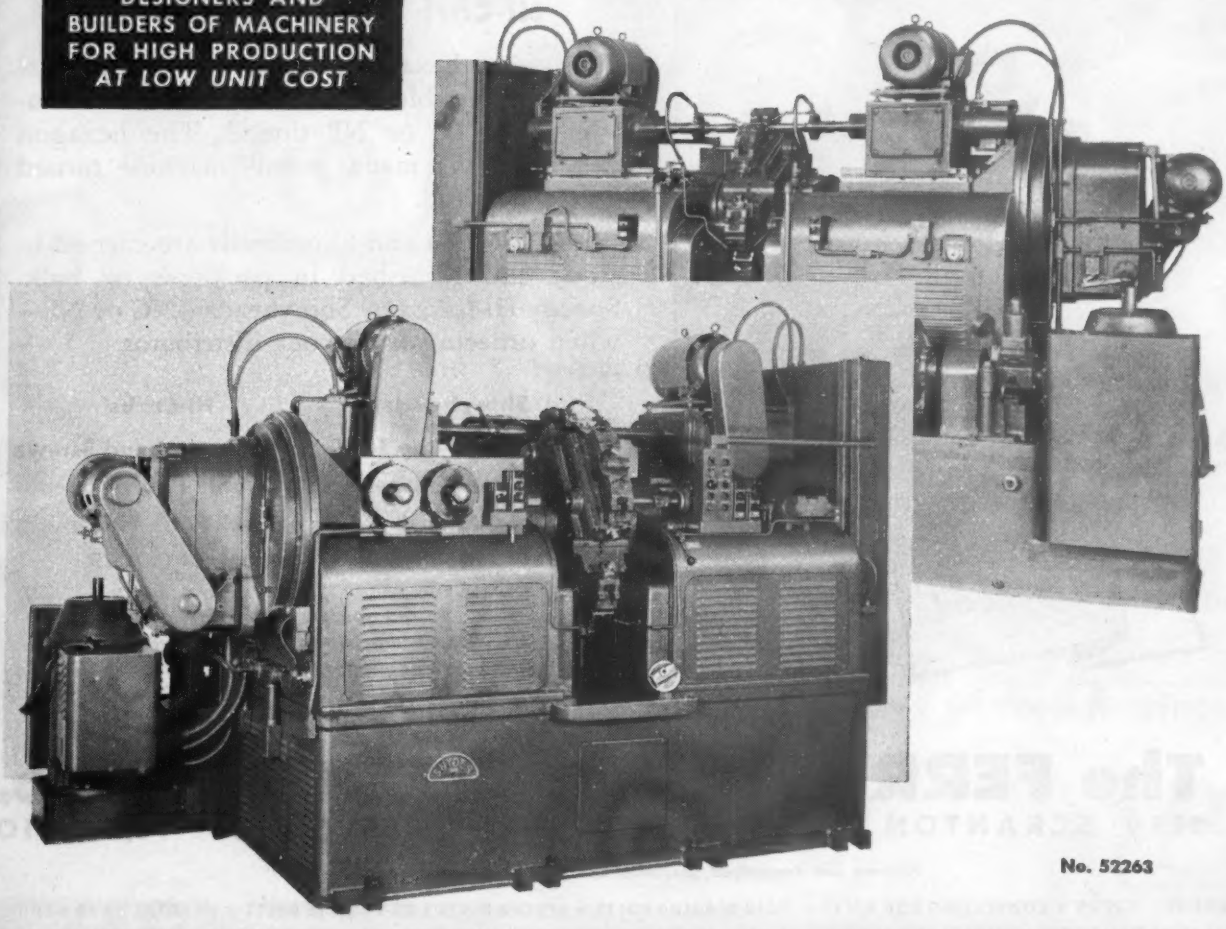
Tapping units are equipped with individual lead screw and quick-change pick-off gears for tool speed change. Lead screws for various pitch threads are easily exchanged.

Control equipment is set up for manual or automatic operation, control buttons being provided for setting up each individual tool spindle independently. Production is approximately 300 pieces an hour at 80% efficiency.

We invite consultation regarding any metal-cutting production problem involving the factors of time, accuracy, finish, handling fatigue and safety. These factors, and the ultimate factor of cost can be controlled through Snyder special-purpose machines. Snyder Tool & Engineering Company, 3400 E. Lafayette Avenue, Detroit 7, Michigan.

SNYDER
DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST

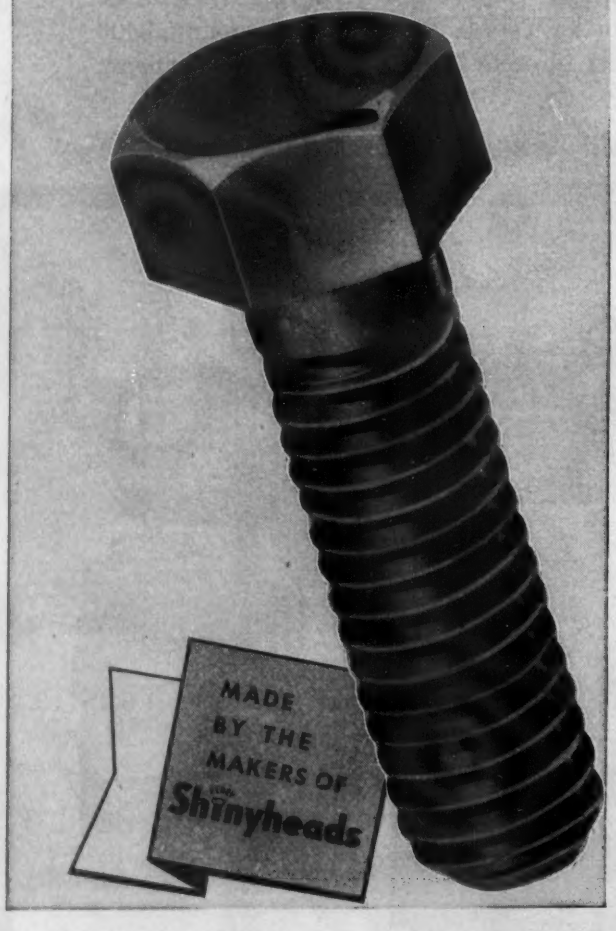
21 Years of Successful Cooperation with Leading American Industries



No. 52263

Announcing a new name

Hi HEAT TREATED Carb



Hi-Carb is the new name for Ferry Cap Hexagon Head Screws made of high carbon C-1038 steel and double heat treated, black satin finish.

It's an easy-to-remember name and saves time in ordering. No need to describe the product —simply write:

Hi-Carb NC or Hi-Carb NF

This means hexagon head screws of high carbon steel, double heat treated, black satin finish—with NC or NF thread. The hexagon heads are die made; points machine turned and chamfered.

Both Hi-Carbs and Shinyheads are carried in stock and furnished in packages or bulk. Specify Hi-Carbs or Shinyheads—NC or NF—when ordering from your distributor.

Shinyheads	Hi-Carbs
Hexagon Head Cap Screws	Hexagon Head Screws
Standard Full Finished	Double Heat Treated
Mirror Bright Finish	Black Satin Finish
Material C-1038	Material C-1038

Write for A-3 folder containing description, steel specifications—chemical analysis and physical properties.

The FERRY CAP & SET SCREW Co.

2159 SCRANTON ROAD • • • • • CLEVELAND 13, OHIO

Pioneers and Recognized Specialists Cold Upset Screw Products since 1907

CAP AND SET SCREWS • CONNECTING ROD BOLTS • MAIN BEARING BOLTS • SPRING BOLTS AND SHACKLE BOLTS • HARDENED AND GROUND BOLTS
SPECIAL ALLOY STEEL SCREWS • VALVE TAPPET ADJUSTING SCREWS • AIRCRAFT ENGINE STUDS • ALLOY STEEL AND COMMERCIAL STUDS • FERRY PATENTED ACORN NUTS

New forging techniques—developed by Ladish research — provide maximum strength in vital parts through controlled grain flow at points of greatest stress.

Ladish engineers are available for consultation on designing postwar products to higher limits of strength and safety through use of drop forgings.

DROP FORGINGS UP TO 3000 lbs.

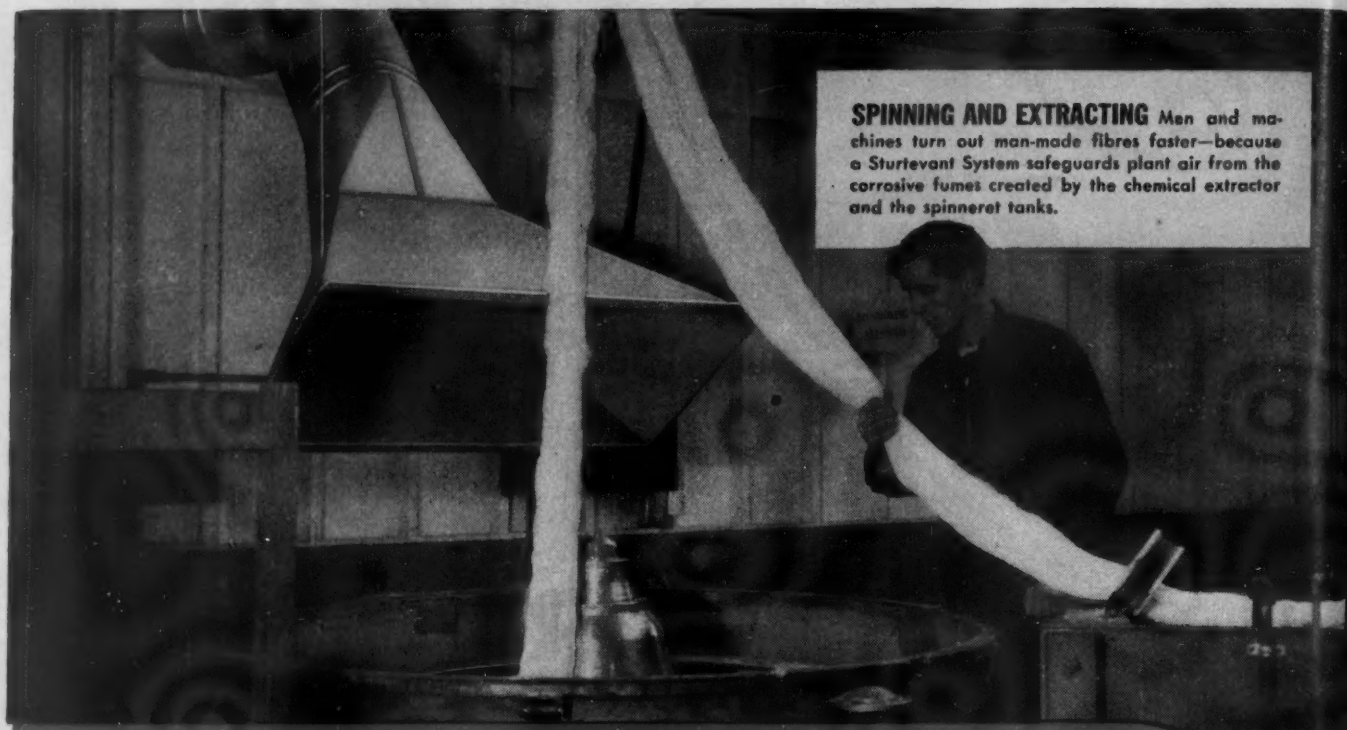
ARMY E NAVY

LADISH DROP FORGE CO.

CUDAHY • WISCONSIN

MILWAUKEE SUBURB

TO MARK PROGRESS

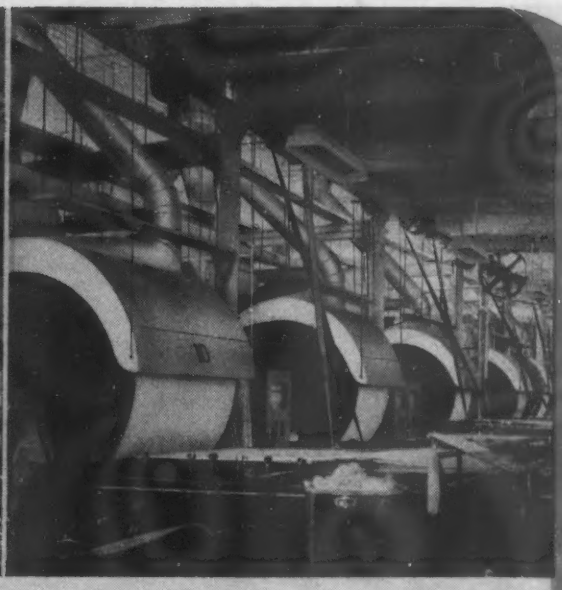


SPINNING AND EXTRACTING Men and machines turn out man-made fibres faster—because a Sturtevant System safeguards plant air from the corrosive fumes created by the chemical extractor and the spinneret tanks.

New Profits from Old Processes -when you CLEAR the AIR!

POURING AND SANDBLASTING Time was when foundrymen and many others in the metal industries—had to be good smoke-and-dust eaters. Not so today with Sturtevant Systems on the job—removing the menace that puts machines out of kilter, slows down workers.

PACKAGING AND COOKING Thanks to Sturtevant Systems, food and candy makers call their shots on indoor weather—from receiving floor to packing room—with temperature and humidity made to order for a cleaner, more uniform product, greater output from machines and employees.



DRYING AND DYEING Steam condensing on ceilings or equipment is a hazard with many processes such as dyeing and warp drying. But a soundly engineered Sturtevant System licks the problem—takes a big slice out of power and maintenance costs.

ENAMELLING AND BAKING These operators coat parts with enamel at entrance to Sturtevant Dryer—designed so that plant air is clean and comfortable, and to insure uniform drying of a wide range of shapes and sizes at production-line rates.

MIXING AND GRINDING As with countless processes—so with this Banbury Mixer—Sturtevant came in and banished a production headache. Dust system clears the air, as lampblack and other powdery ingredients are dumped in. Conveying System carries off empty bags cleanly, economically.

VAPOR ABSORPTION

DRYING

PNEUMATIC CONVEYING

AIR CONDITIONING

DUST AND FUME CONTROL

HEATING AND VENTILATING

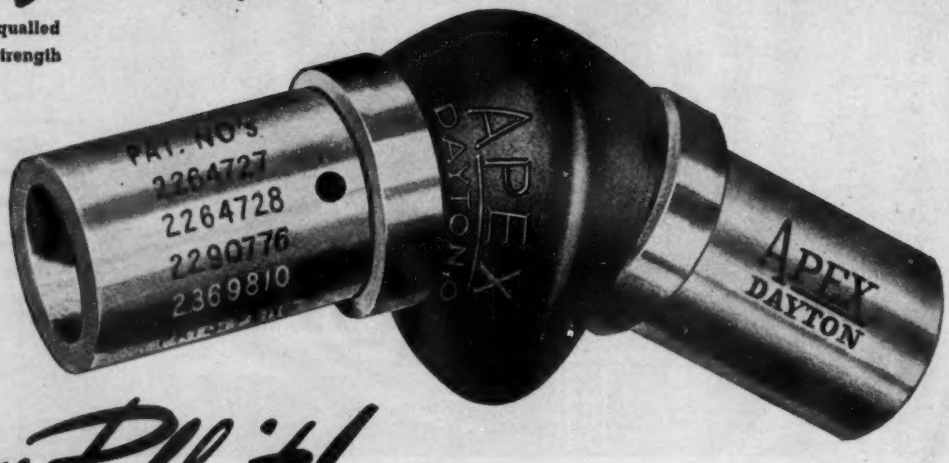
By eliminating loose dust, smoke, fumes, heat, steam with a Sturtevant air system you can coax greater output from labor and equipment—step up product quality and *keep it there*—often effecting improvements in processing and plant layout. Shown here are a few of the many instances in which Sturtevant equipment and Sturtevant know-how have combined to raise profits, reduce costs and improve quality. Whatever your business or product may be, you can count on Sturtevant to understand your problems.

Sturtevant
REG. U. S. PAT. OFF.
Puts Air to Work

B. F. STURTEVANT COMPANY
Division of Westinghouse Electric
HYDE PARK, BOSTON 36, MASS.

* ① Torque it!

It has unequalled torsional strength



** ② Push or Pull it!

It has unmatched tensile and compression strengths

*** ③ Run it under load!

It outlasts any conventional joint, withstands the most adverse operating conditions

Facts

demonstrate beyond question that Apex Heavy Duty Universal Joints are stronger, lighter, will outperform and outlast any joint you can buy.

The Reasons: Apex exclusive design balances the strength of the yokes, block, and pins to provide greater static and operating torque, highest shock load capacity, lowest deflection and maximum freedom from binding under overload. Apex exclusive cover (optional) seals lubricant in, seals foreign matter out, dampens vibration, minimizing fatigue and wear. More: it permits running Apex joints in corrosive or dust-laden atmosphere, in water, caustics, acids, etc. Apex joints won't throw oil, will not freeze at minus 75°F. nor fail at plus 250°F. Unprecedented performance in any adjustable multiple-spindle drill. Sizes: ⅜ to 4 inches. Style of barrels: you name it. Write for Apex Joint "Data Rule."

Nominal size (inches)	* ① Static torque (inch-lbs.)	** ② Axial ten. & compres. (lbs.)	*** ③ Recommended operating torque (inch-lbs.)
⅜	220	440	36
½	480	800	81
⅝	860	1,200	145
¾	1,760	1,600	300
⅞	2,800	2,000	475
1	4,000	2,400	675
1¼	8,000	3,600	1,350
1½	11,600	4,800	1,950
1¾	14,000	6,000	2,300
2	26,000	10,000	4,300
3	65,000	20,000	10,350
4	140,000	50,000	21,000

APEX

Industrial Universal Joints

THE APEX MACHINE & TOOL COMPANY • DAYTON 2, OHIO

Exclusive Licensee Under F. & S. Joint Patents

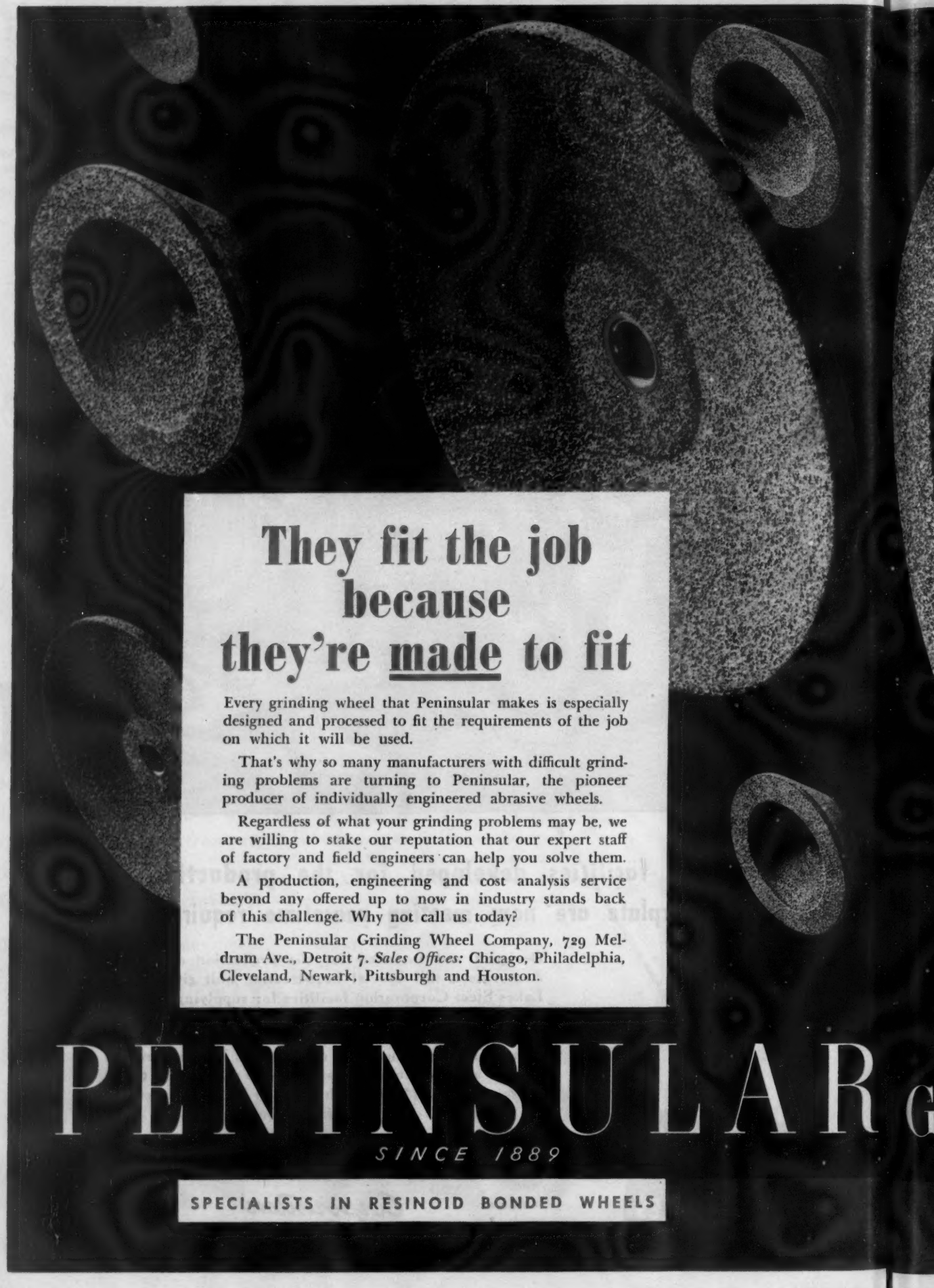
The modern facilities developed for the production of N-A-X Armorplate are now meeting peacetime requirements

Designed and installed for the production of N-A-X Armorplate, this special heat-treating unit gives Great Lakes Steel Corporation facilities for supplying you with alloy sheets and plates fully heat-treated (quenched and drawn) to a wide range of high physical properties, constantly uniform in hardness and flatness. Pre-heat-treated N-A-X alloy sheets and plates can be supplied in thicknesses of ⅛″ to 1″; in widths of 6″ to 72″; and in lengths up to 336″. For complete information, write:

GREAT STEELS FROM GREAT LAKES

GREAT LAKES STEEL
Corporation

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
UNIT OF NATIONAL STEEL CORPORATION



They fit the job because they're made to fit

Every grinding wheel that Peninsular makes is especially designed and processed to fit the requirements of the job on which it will be used.

That's why so many manufacturers with difficult grinding problems are turning to Peninsular, the pioneer producer of individually engineered abrasive wheels.

Regardless of what your grinding problems may be, we are willing to stake our reputation that our expert staff of factory and field engineers can help you solve them.

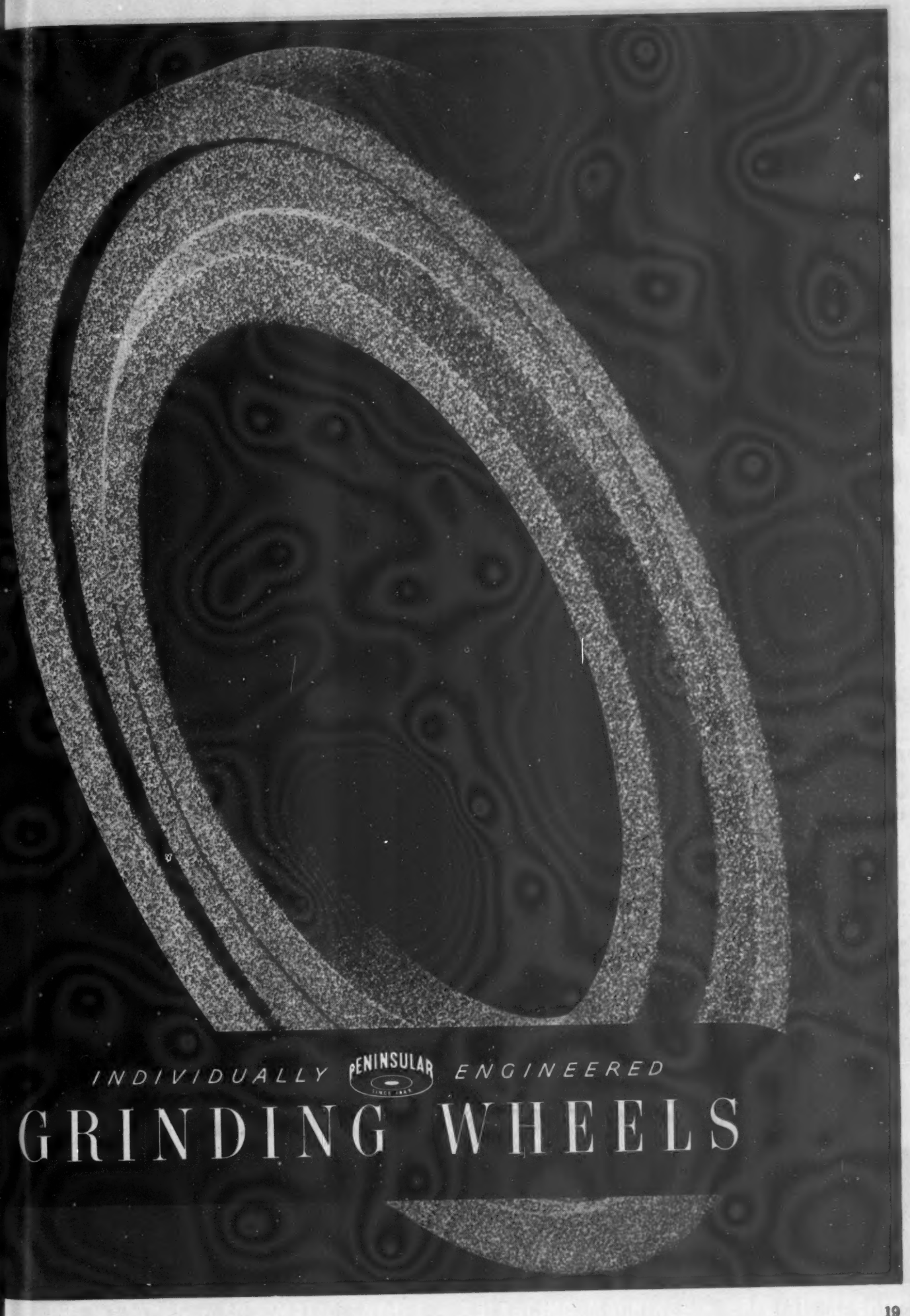
A production, engineering and cost analysis service beyond any offered up to now in industry stands back of this challenge. Why not call us today?

The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Cleveland, Newark, Pittsburgh and Houston.

PENINSULAR G

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS


INDIVIDUALLY PENINSULAR ENGINEERED
GRINDING WHEELS

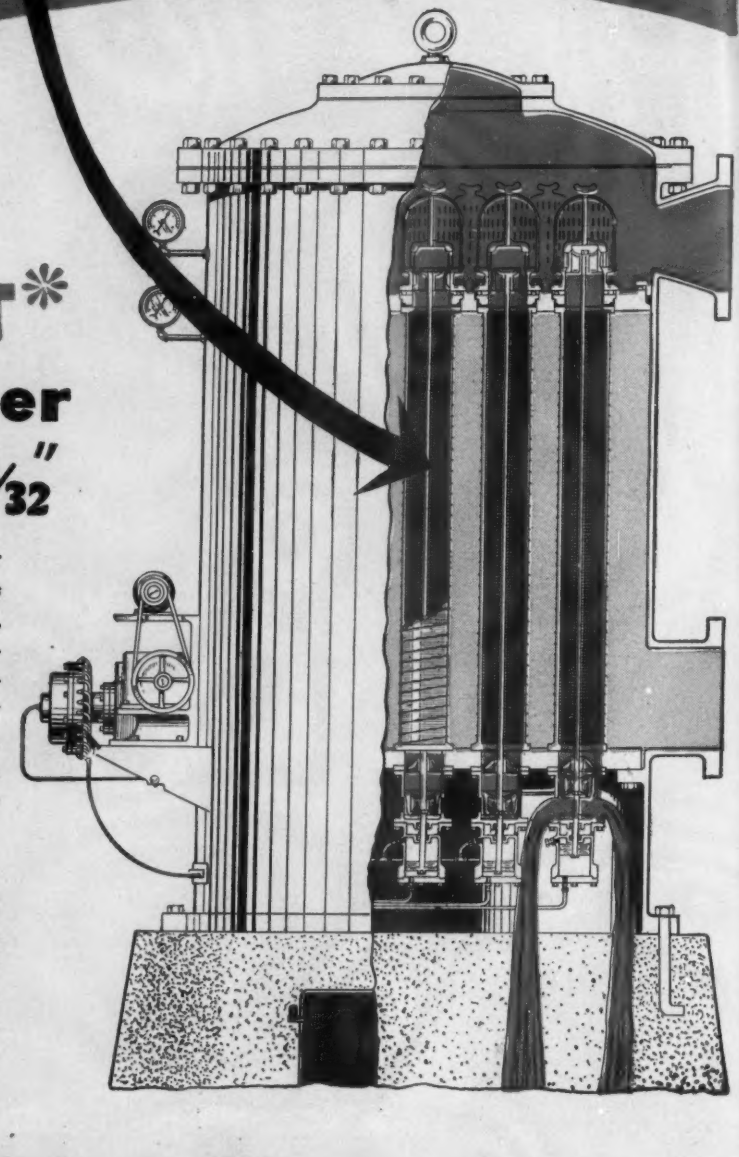
ADAMS AUTOMATIC WATER FILTERS

Remove GRIT and DIRT* from River Water

*15 times finer than 1/32"

Adams *Poro-Screen* Filters offer a practical answer to large-scale filtration of dirty river water for use in hydraulic equipment. Designed for continuous, automatic operation and requiring a minimum of attention, Adams Automatic Filters supply the required volume of clean water for your operations—water free of dirt and grit which damage bearings, rolls, valves and other equipment. Highly successful on water cooling installations of open-hearth and heat-treating furnaces.

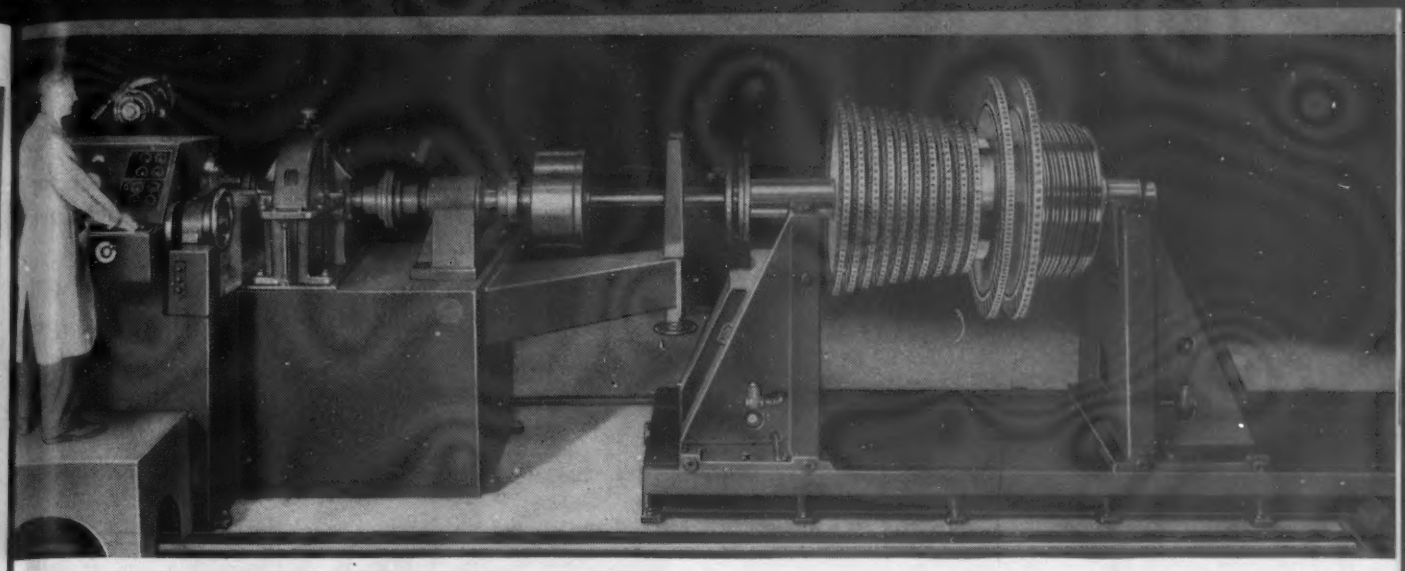
Adams Automatic Filters provide low velocity filtration. Their multiple tube design has no moving clearances, is fully automatic. One tube is back washed at a time while filter is delivering full rated capacity. Adjustable control gives flexibility of back-washing—excessively dirty water more frequently, normal water less frequently. Built in four sizes from 300 gpm. to 2000 gpm. Write for Bulletin 901.



★ R. P. ADAMS COMPANY, INC. ★

75 CHICAGO STREET, BUFFALO, N. Y.

ADAMS PORO-STONE AND PORO SCREEN FILTERS



GISHOLT DYNETRICS* go to *any length* to eliminate vibration!

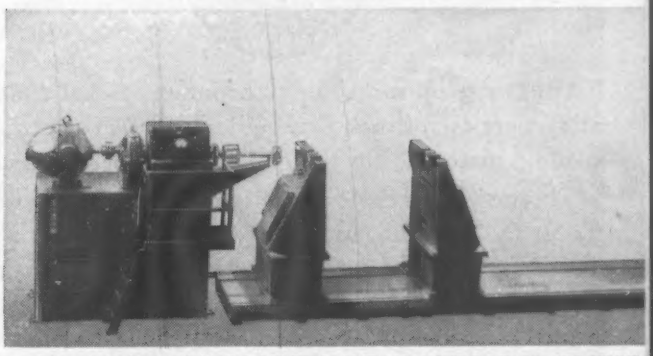
That's no mere figure of speech. It's literally true! For the basic principle of *Gisholt Dynetric Balancing Machines* is so flexible that it can be used to locate and measure unbalance in any rotating part, without regard for weight, size, or length of the piece.

In the photo above, a Gisholt Floor Type Dynetric Balancing Machine is seen balancing a turbine spindle similar to those used for driving propellers of merchant ships and warships. This machine is capable of balancing parts with an outside diameter of 100″ and weighing up to 12½ tons. Its use eliminates destructive vibration and assures trouble-free operation over extremely long periods.

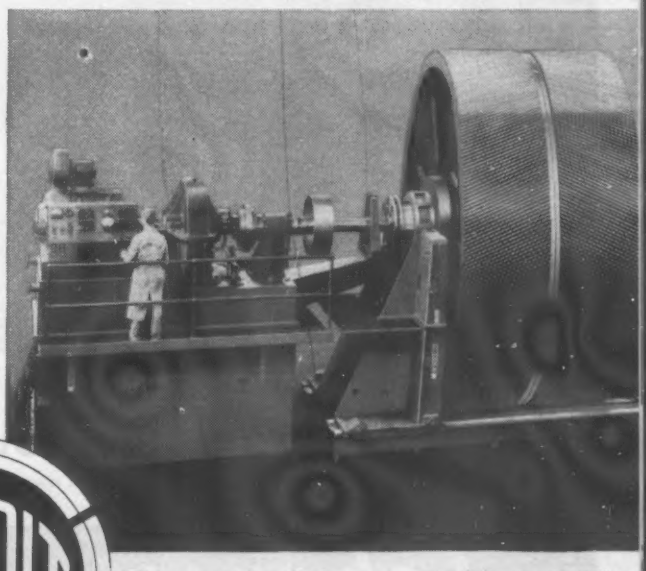
Wherever precise balance can improve the performance of your product, whether the part weighs a fraction of an ounce or many tons, there's a Gisholt Dynetric Balancing Machine to do it more quickly, more accurately, and more economically than by any other means. Write for full information.

**A development of Westinghouse Research Laboratories.*

GISHOLT MACHINE COMPANY
1217 East Washington Avenue • Madison 3, Wis.



THIS GISHOLT FLOOR TYPE DYNETRIC BALANCING MACHINE used for balancing the spindles of steam turbines, before and after blading, is capable of balancing parts having outside diameters of 150″ and weighing up to 30 tons.



This 50-ton herringbone gear used in transmitting power to the propeller of a large battleship is balanced on another Gisholt Floor Type Dynetric.

Look Ahead . . . Keep Ahead . . . With Gisholt

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

Lebanon Circle Ⓛ 30 Meets TAPPI Specifications for Chromium Nickel Castings

TAPPI* specifications for a chromium nickel stainless alloy were established as a guide to correct selection of casting material for the pulp and paper industries.

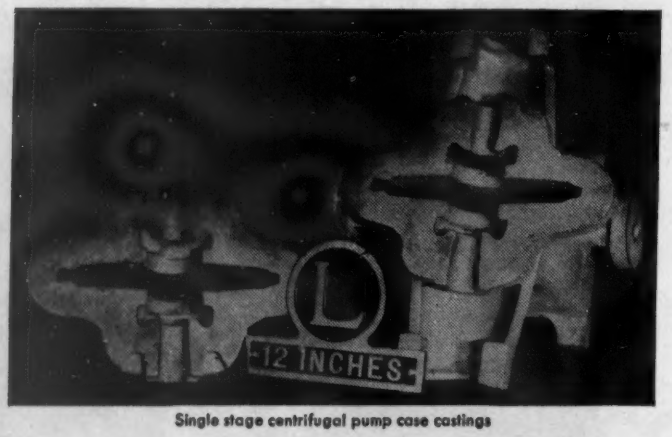
These specifications are fully met by Lebanon Circle Ⓛ 30 (a 24% chromium, 11% nickel stainless alloy) as well as by its variants—Circle Ⓛ 30Cb. (containing columbium) and Circle Ⓛ 30XM (containing molybdenum). Circle Ⓛ 30 is particularly serviceable wherever corrosive action by sulphite liquors must be resisted. It has an exceptional record of service in digester fittings, valves, pumps and strainers.

Lebanon Circle Ⓛ 30 is being used successfully for many corrosion applications in process industries other than pulp and paper.

A study of the physical properties shown below will be helpful. For recommendations suited to your specific needs, write and give us service history; or arrange for an appointment with a Lebanon metallurgist or foundry engineer.

Technical Association of the Pulp and Paper Industry

Valves and fittings for pulp and paper industries



Single stage centrifugal pump case castings

LEBANON CIRCLE Ⓛ 30

NOMINAL PHYSICAL PROPERTIES
Water Quenched

Lebanon Designation	Tensile Strength	Yield Point	Elongation in 2"—%	Brinell Hardness
Ⓛ 30	85,000	50,000	35	165
Ⓛ 30Cb.	85,000	50,000	35	165
Ⓛ 30XM	85,000	45,000	25	170

Send for Revised Bulletin. Data about Lebanon Circle Ⓛ 30 has been brought up-to-date in a new, revised bulletin—just issued. Bulletin covers general information, chemical analysis, physical properties and lists corrosive agents resisted by this alloy. Write today for your copy.

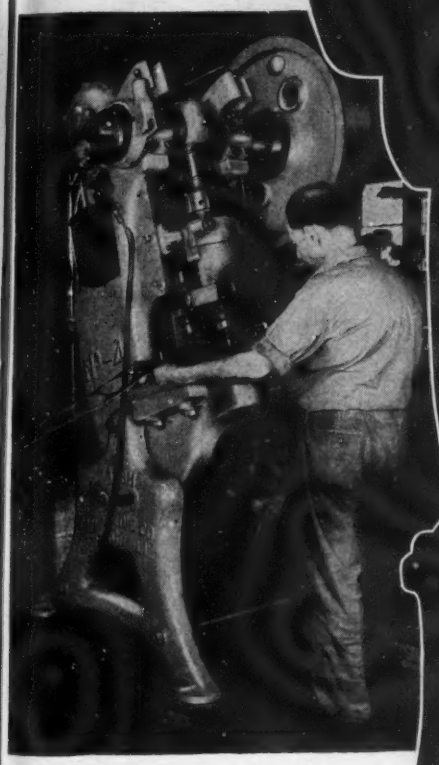
LEBANON STEEL FOUNDRY **LEBANON, PA.**

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

"In the Lebanon Valley"

Lebanon ALLOY AND STEEL Castings

Walsh PUNCH PRESSES



Maximum production at bottom costs because of features based on nearly a half century of engineering and building punch presses.

Stability — heavy-duty semi-steel frames.

Inclinability — positively locks in any position.

Crankshafts — forged alloy steel, *normalized and ground.*

Bearings — crank and frame bearings are scraped in for proper alignment and operating accuracy.

Slide and Gibs — scraped in to .002 alignment between bolster plate and slide-bottom surface. Slide has solid surface for accurate alignment of die shoe. Die shank is clamped onto slide by means of circular clamping.

Safety Locks — on crankshafts to prevent operation of press while changing dies.

Flywheel — dynamically balanced; has cast running bushing between flywheel and crankshaft. *Solid webs for safety.*

Lubrication — pressure fittings at all bearing surfaces.

Clutch — Positive action. All parts centerless ground, hardened, forged alloy steel.

Knockout — positive and adjustable.

Drive — Multiple "V"-belt. Can be adjusted while press is running. Motor has overload relay.

All Walsh Presses are equipped with exclusive patented Two-Button Safety and Non-Repeating Device. Available in all sizes for 6 to 80 tons capacity. Over-nite service on maintenance parts. Qualified engineering service in all territories.

The Best in Power Presses since 1907

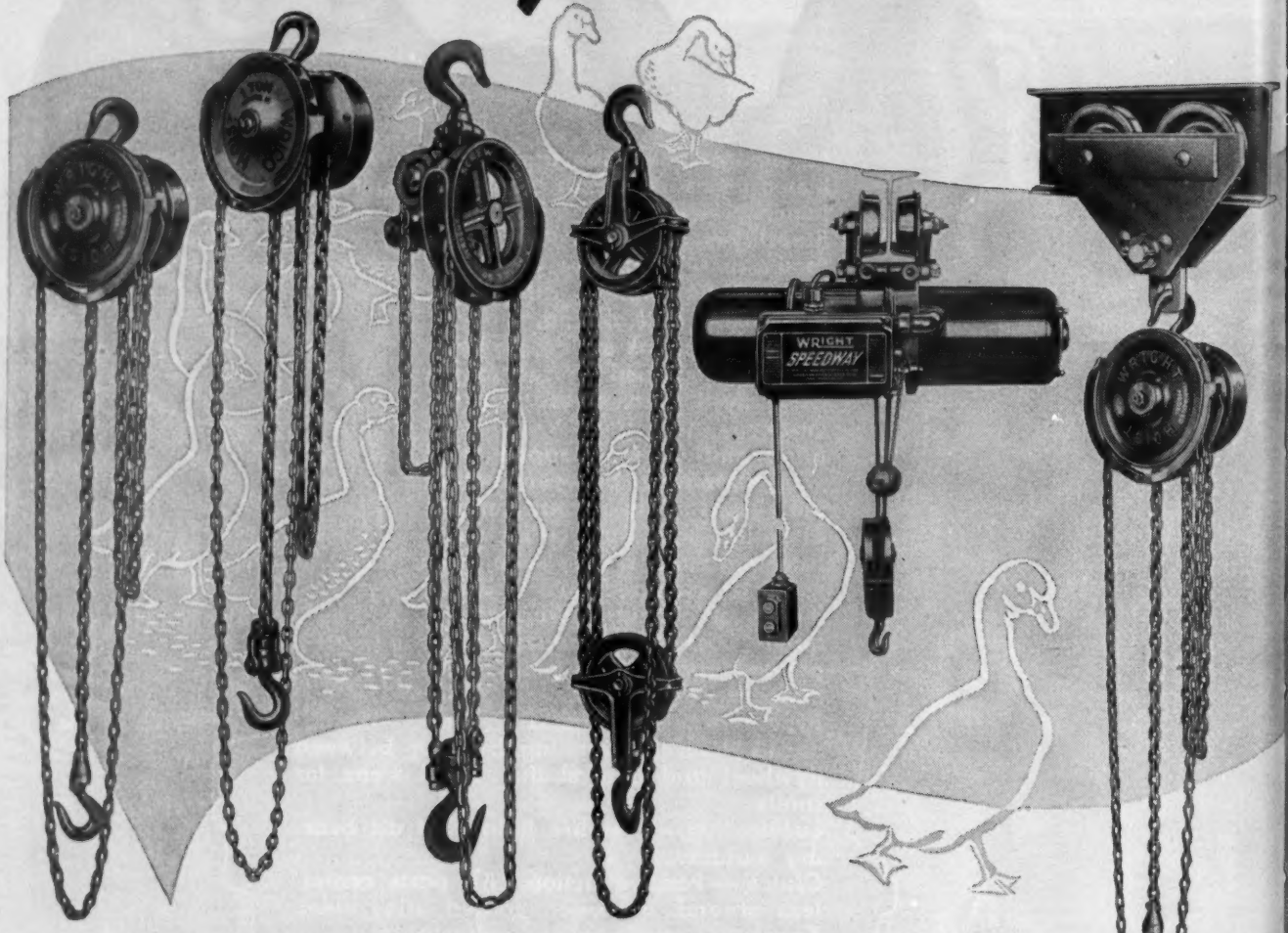
WALSH PRESS & DIE CO.

DIVISION OF AMERICAN MACHINE & GAGE CO.

Plant 4725 W. Kinzie St., Chicago (44). Offices in Buffalo, Elmira, Rochester, Syracuse and New York City, Milwaukee, Detroit, Minneapolis, Cleveland, Indianapolis, and Greenwich, Conn.

THE WRIGHT LINE

HAS A WHOLE *Flock* OF ADVANTAGES!



● Every hoist, every trolley, every crane in the **WRIGHT** line has distinctive advantages for specific jobs. Indeed there are a whole flock of **WRIGHT** advantages, such as

1—Special analysis steel chain, electrically butt welded, heat-treated and proof-tested. Will not work harden.
2—Each link is gauged to fit pocket wheel. The chain is exceptionally high in tensile strength.
3—Non-fouling chain guide permits pulling of hand chain from any angle below hoist.
4—Planetary gear reduction of efficient and compact design.
5—Drop forged bottom hook from special analysis steel gives visible warning when overloaded through slowly opening without fracture, thus providing safe operation.
6—Precision ball bearings to increase efficiency and ease of operation.

Another **WRIGHT** advantage is engineering based on three principles: Safety, Efficiency and Economy. See your local **WRIGHT** distributor.

ACCO

York, Pa., Chicago, Denver, Los Angeles, San Francisco, Portland, New York, Bridgeport, Conn.

WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS • HARDENED AND PRECISION GROUND PARTS • SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS • SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES

PRECISION · EXPERIENCE · DEPENDABILITY

ALLIED CORPORATION PRODUCTS

FIT

Allied sheet metal dies, intricate jigs and fixtures and production tools in great quantity *perfectly fit* the jobs they're made for, always. And Allied's four great plants, its engineers and skilled workmen and its mature business experience are now available to manufacturers in the radio, home appliance, automobile, aviation, farm implement, electrical and other mass production fields. Precision to the finest tolerances, economical production and deliveries *on time* are other plus factors of Allied service. Without incurring any obligation, send in your blueprints —or write, describing your needs, today.

ALLIED PRODUCTS CORPORATION

Department 34
4628 Lawton Avenue
Detroit 8, Michigan

This Youngstown Alloy Link
Holds a 45,000-ton Battleship on Leash

IN few services does steel take more punishment than in an anchor chain. Wind and tide tug at it, keep links rubbing against each other, keep bottom sand cutting its surfaces. It must stand strain and shock, resist corrosion and abrasion. It must hold its vessel securely in roughest water.

This die-lock link, forged from tough alloy steel bar stock, is a triumph of engineering design and manufacture over Nature. Product of the Boston Navy Yard, made of standard alloy, this link is much lighter in weight, yet far stronger, than other types of ordinary iron and steel. It uses less steel and makes a better, much longer lived chain, abrasion resistant, an excellent leash for even our big 45,000-ton battleships.

Having proved its ruggedness in anchor chains for the Navy, Youngstown Alloy Steel is ready to serve in your toughest jobs. It is furnished to standard specifications. Your inquiry is invited.

QUALITY · YOUNGSTOWN · SERVICE

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN 1, OHIO

Manufacturers of

CARBON · ALLOY AND YOLOY STEELS

Pipe and Tubular Products · Sheets · Plates · Conduit · Bars · Coke Tin Plate · Electrolytic Tin Plate · Rods · Wire · Nails · Tie Plates and Spikes

See your Jobber for

Black Arrow Heavy Duty Cutting Torches

Designed to cover all types of heavy duty, continuous service production work including cutting up to 20", rivet burning, hole piercing, gouging and scarfing. Each torch is sturdily built to withstand hard usage. Constructed of nickel silver and brass tubes, forged brass head, body, and valves. Net weight, all cutting torches, only 2 lbs., 14 oz. Leading jobbers now carry these torches as part of the new Black Arrow line of Gas Cutting and Welding Apparatus. For complete outfits, torches, tips, regulators, accessories or supplies, see your Black Arrow jobber first.

BLACK

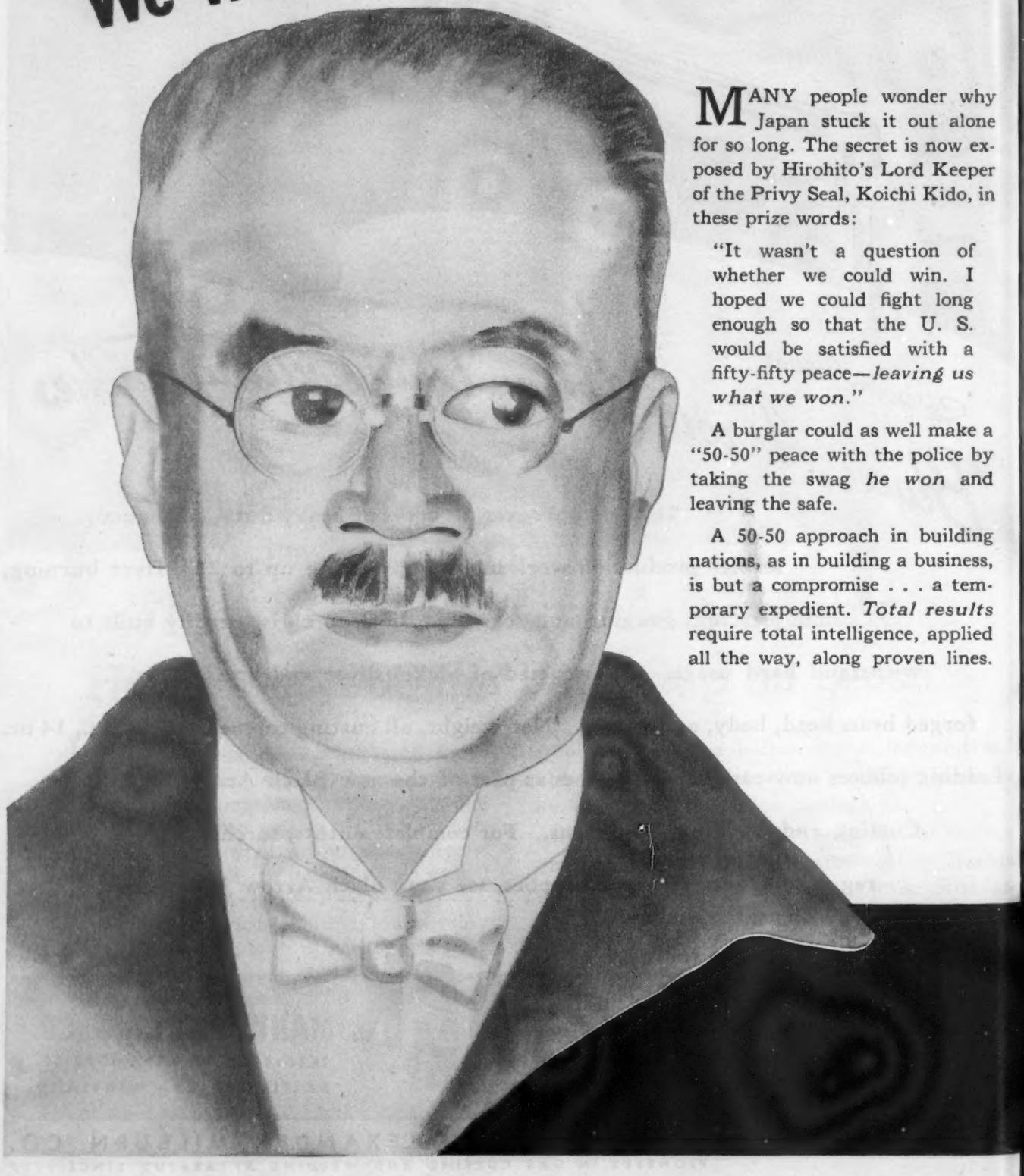
The modern packaged line of Gas Cutting & Welding Apparatus

THE BLACK MANUFACTURING CO.
1416-1428 W. BALTIMORE ST.
BALTIMORE 23, MARYLAND

FORMERLY THE ALEXANDER MILBURN CO.
PIONEERS IN GAS CUTTING AND WELDING APPARATUS SINCE 1907

then he said to himself:

"We want a 50-50 Peace on Earth"



MANY people wonder why Japan stuck it out alone for so long. The secret is now exposed by Hirohito's Lord Keeper of the Privy Seal, Koichi Kido, in these prize words:

> "It wasn't a question of whether we could win. I hoped we could fight long enough so that the U. S. would be satisfied with a fifty-fifty peace—*leaving us what we won.*"

A burglar could as well make a "50-50" peace with the police by taking the swag *he won* and leaving the safe.

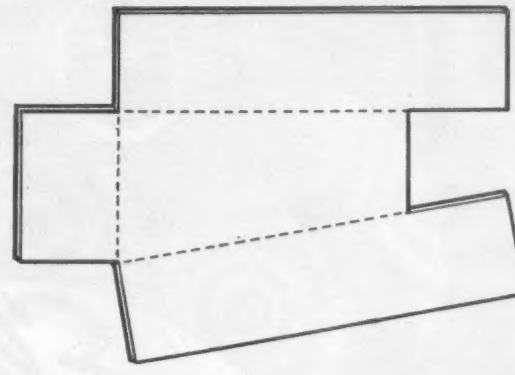
A 50-50 approach in building nations, as in building a business, is but a compromise . . . a temporary expedient. *Total results* require total intelligence, applied all the way, along proven lines.

"50-50"... he hoped for

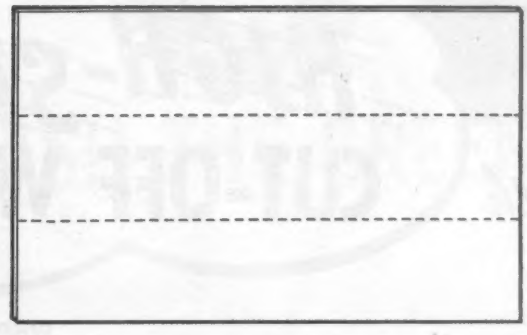
LOOK, KIDO, how manufacturers contribute to *total peace* between themselves and their customers:

No compromise here..They save $2.74

FORMER DESIGN $5.06



Stamp or cut two of these parts from ¼" plate.



Stamp this piece from ¼" plate.

WELDED DESIGN $2.32

Jig up and weld . . . Saves $2.74. Cuts weight from 33 lbs. to 23 lbs.

THIS frame member illustrates the simplicity of changeover to welded design . . . and shows *how it pays*. Here it cuts costs 54% and produces a stronger, more rigid and lighter product . . . one that can be constantly improved easily and quickly.

Here is the key to a 100% solution to many of your problems of today. The Lincoln Engineer will gladly help you get the results *you* want. Studies in Machine Design free on request. Ask for them on your business letterhead.

THE LINCOLN ELECTRIC COMPANY • Dept. L-1 • Cleveland 1, Ohio

America's greatest natural **recourse**

ARC WELDING

Electro HIGH-SPEED CUT-OFF WHEELS

WORKING *with* CONFIDENCE

Operators get a great kick out of using these new, ultra-thin, amazingly strong Electro CUT-OFF WHEELS.

They sock the loads to 'em with absolute confidence in their own safety because they know that, with resin-bonding, we finally solved the problem of achieving tremendous strength in wafer-thin wheels.

Instead of the boredom of nursing and waiting for the cutter to worry its way through the cut, they get a thrill out of watching these new Electro Cut-Off Wheels wade right through hard or soft, thick or thin metals or ceramics (under wet or dry conditions) in seconds instead of minutes.

WHEEL TRUTH

Precision in processing, bonding and forming the abrasives into these sensational new wheels, achieves "wheel truth" in a remarkable degree. Spots of varying density and hardness do not occur. Uniformity is maximum throughout. This uniformity, balance and minimum removal of material, because of narrow cut, assure long life. The narrow cutting also increases the cutting speed of the special processed grits, with gratifying gains in production per man-hour.

WHEEL BALANCE

Uniform density and precision-forming balance these wheels so accurately that vibration ceases to be a problem. With vibration so splendidly minimized remaining side friction is not enough to cause over-heating. Resulting cuts are so clean, finish along the cut-offs is often sufficient. The high cutting speed, minimum material cuts and great reduction in wheel breakage, achieve a wholly new degree in cutting-off economy

For Complete Details, Write On Your Company Letterhead for a Copy of the Most Talked Of Catalog in Industry, Our New Grinding Wheel Catalog-Handbook, No. 645.

Electro TRADE MARK SINCE 1919

Electro REFRACTORIES & ALLOYS CORPORATION

MFRS. • KILN FURNITURE • REFRACTORIES • CRUCIBLES • GRINDING WHEELS

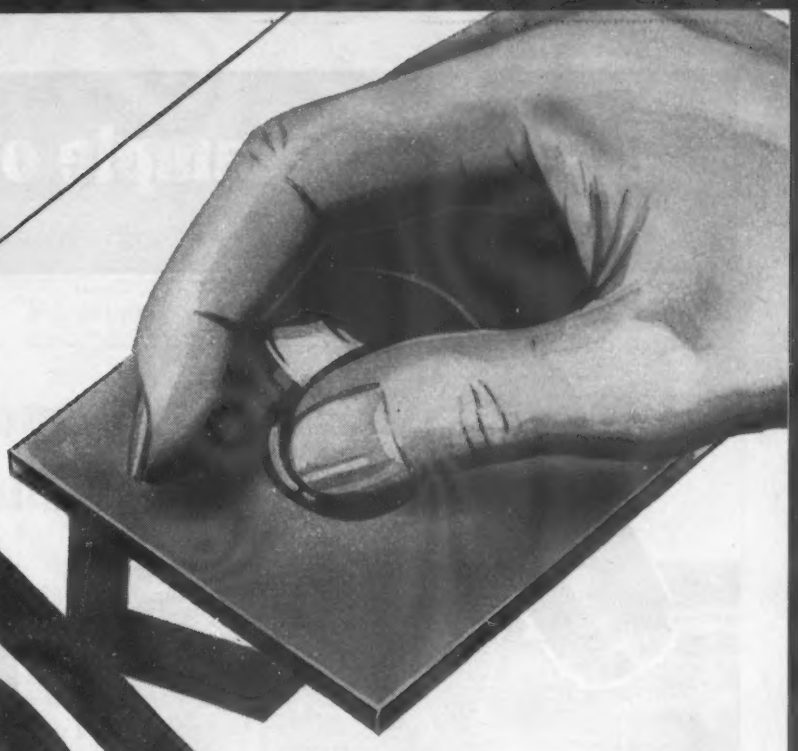
344 DELAWARE AVENUE — West Coast Warehouse Los Angeles — BUFFALO 2, NEW YORK

WHEN YOU

CALL SALEM

ABOUT HEATING FURNACES

STEP 5



OK

...YOU FLASH THE GREEN LIGHT

On new heating furnaces or related equipment, Salem engineers work closely with you and your staff.

After preliminary spade work, a Salem heating engineer checks over final plans and drawings with you. Before you give us the green light for construction, you have the opportunity of analyzing all details of the installation in light of your production. Thus you assure yourself of maximum efficiency in the proposed installation.

The detailed preliminary planning embraces exchange of ideas between you and Salem's heating men, preparation of visual roughs, testing, and the incorporation of new innovations you want for lowest cost operation.

Production efficiency, as you well know, depends upon thoroughness of planning and workmanship. Salem's step by step planning gives you the kind of heating installation you want for competitive production.

CALL SALEM, originators of Engineered Heat and builders of the world's largest rotary forge furnace, for any type, size, or style of heating furnace or related equipment.

NOTE: Write for Salem's new 16-page, illustrated booklet—"Engineered Heat," complete with easy-to-use heating and temperature charts.

SALEM

ENGINEERING COMPANY

SALEM, OHIO

SALEM ENGINEERING COMPANY

Engineered Heat

Up-to-date example of COST REDUCTION

● 1st operation on automotive part—turned from bar stock—15 operations in 16 seconds.

Acme-Gridley Bar Automatic—set up from 1st operation.

● 2nd operation o same—or duplicate—machine. 6 operations in 11 seconds—with magazine feed.

Set up for second operation showing magazine in position.

TIME SAVED = MONEY SAVED

AUTOMATIC loading methods on Acme-Gridley Machines—gravity or conveyor magazines, feeding through rear of spindle and pick-off—introduce new ways to reduce the cost of precision parts, wherever secondary machining is involved.

The Acme-Gridley is truly a universal machine, with quick adaptability to a wide range of work, under conditions of high production and extreme accuracy.

Tell us your production problems—and we will tell you how fast. No obligation.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

COLLETS AND PUSHERS

The design, materials and methods of processing GENUINE Acme-Gridley Collets and Pushers are vital to continuous low-cost performance on your Multiple Spindle Automatics.

Bulletin CP-45

Advertisement DECEMBER, 1945

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by Bridgeport Brass Co. "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*

Machining Stronger, Tougher Alloys for Higher Quality Parts

Standards are rising, and modern materials are expected to stand up under more punishment, greater stresses and generally more severe service conditions. Metallurgical research has kept pace with mechanical advances, and there are available copper-base engineering alloys which have high strength, great corrosion and wear resistance and many other desirable properties for modern requirements.

Product designers and engineers are specifying these alloys to an increasing extent. Therefore, it is up to the manufacturers of screw machine products to learn the best methods for cutting such materials rapidly and economically. Since these alloys are stronger, harder and tougher than brass and many of the steels, their machining is more difficult until the cutting characteristics of these alloys are determined.

Coolant Characteristics Important

Although most screw machine operators, when trying out a new material experiment as to speeds and feeds, and tool shapes, they seldom make exhaustive tests on the coolant and lubricating oils or solutions.

Since the tougher alloys require more power and pressure for chip removal much of this energy is converted into heat with the result that there is a tendency for the work to become hotter with attendant dulling of the tools. Dissipation of this heat can sometimes be accomplished by using a larger reservoir of the coolant and applying a greater volume of the coolant over the work and tools.

The same net results can be obtained by using a coolant which possesses better heat transfer properties to insure faster cooling. It is obvious, therefore, that if both the work and the tools can be kept cool it is often possible to increase the machining rate and reduce tool wear by the use of a more efficient cooling medium.

Research will pay off in lower costs and increased production. There is no other field where the results of research can be realized so quickly as in the manufacture of screw machine items.

Machining Duronze III

Typical of modern engineering alloys is Duronze III, a high-strength, corrosion-resistant silicon-aluminum bronze. It is available in round, hexagon and square rod for meeting the requirements of production turning and threading processes. Experience gained from machining millions of pounds of this alloy indicates that under proper conditions of operation Duronze III is satisfactory for screw machine work. Although it contains no lead it possesses good free machining characteristics.

First of all, the tools should be of the proper hardness and kept sharp. If high speed steel tools are used they should have a Rockwell hardness of C63-C65. For some types of machining, such as rough forming and when higher speeds are combined with light feeds, carbide tipped tools may be used to advantage.

Tool angles are also important and consideration must be taken of the type of finish, speeds, feeds, etc., in determination of these angles. It is recommended that the tools should be ground approximately the same as those used for free-cutting steel and adjustments made according to the type of finish, type of machine and lubricant being used. It is usually true that these angles are approximately halfway between those used for brass and those used for ordinary steel.

High speed drills having large flutes permitting adequate chip clearance are used in drilling, with drill speeds and feeds approximating those used in turning and

Table I—Effect of Cooling Medium on the Machinability of Duronze III.

TYPE OF TOOL		FEED PER REVOLUTION		SURFACE FEET PER MIN. HIGH SPEED TOOLS	
				Cutting Oil	Soluble Oil
Box Tool	Roughing	Light Cut	.008	180 to 200	300 to 360
		Heavy Cut	.005		
Box Tool	Finishing	Approx. 1/64"	.010	180 to 200	300 to 360
Drills	1/8" Diam.		.005	100	180
Drills	1/4" Diam.		.007	100	200
Drills	3/8" Diam.		.007	100	200
Drills	1/2" Diam.		.006	100	200
Drills	5/8" Diam.		.005	100	200
Drills	3/4" Diam.		.005	100	200
Threading	External Dies			40 to 50	100 to 120
Threading	Internal Taps			30 to 40	90 to 100
Form Tools		Heavy Cut	.001		
		Light Cut	.002	180	300
Cut-off Tools			.0025	180	300

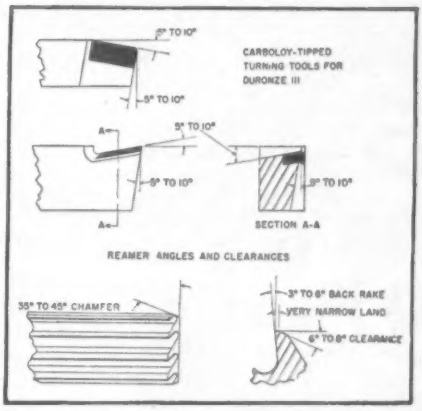


Figure 1—Lathe Tool for Forming and Turning DURONZE III, also Reamer Angles and Clearances.

forming. Close hole sizing is usually obtained through use of standard reamers. Reamers used commonly have 3° to 6° back rake, narrow lands and 6° to 8° clearance.

Tapping results are good if a gun type or spiral cutting tap is used, as it is very important to keep chips clear of the work. Chasers should incorporate a rake angle of 5° to 8° and be backed off at the lands.

The part illustrated in Figure 2 is always

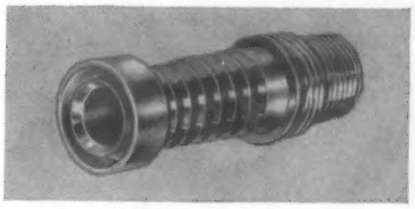


Figure 2—Machined Part and Chips Shown Actual Size.

made from brass. However, for test purposes Duronze III rod was run, using high speed steel tools. Speeds were as follows: formed at 460 S.F.M., drilled at 240 S.F.M., threaded at 120 S.F.M. To engineers, the resulting chips tell a revealing story of good machinability more emphatically than words.

Experiments with Coolants

Due to higher pressures necessary to machine Duronze III, more heat is generated than for brass, and the tools and work

Figure 3—Cut-off and Form Operation.

must be kept cool for proper efficiency. It is therefore very important that ample coolant or lubricant flow on the work and tools at all times. Research and experi-

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

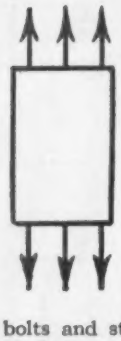
This article is one of a series of discussions by C. L. Bulow, research chemist of the Bridgeport Brass Company.

EFFECT OF STRESS ON CORROSION

How Stresses Are Set Up and Measured

The influence of stress in structural parts is an important factor which must always be considered by the engineer and designer. The effect of stress is readily observed when parts fail from overloading. The simplest way to set up a condition of stress is through the application of tensile pull at the ends of a metal bar, plate or rod.

When the magnitude of the stress and the dimensions are known, the average tensile stress per unit of cross sectional area can be readily calculated, and is usually expressed in pounds per square inch (psi).



Where Stresses Are Set Up

The bending, loading or twisting of metal parts will lead to the setting up of tensile or torsional stresses in such applications as tie rods, bolts and studs, cables and hangar rods used in catenary construction; loaded beams and loaded coil springs; tanks, cylinders, tubes and pipes subjected to internal or external pressures; wire rope, twisted shafts, bars, rods, tubes and pipe.

Effect of Applied Stress

The stress may function in one of three ways to produce a premature failure of a metal part:

1. Normal general corrosion (no stress corrosion involved) may occur, gradually thinning the cross-section until the ultimate strength of the material is reached and tensile cracking takes place.

2. Normal general corrosion (with mild stress corrosion) is speeded up by the applied stress which shortens the time required to reach the ultimate strength of the material. Sometimes pits may also function as stress raisers (to be discussed at a later date) which shortens the time required to produce failure.

3. Severe localized corrosion (stress corrosion or season cracking) may occur in the form of narrow crevices or cracks which gradually penetrate the metal. This is particularly true in thin sections. The effect of stress on corrosion is particularly insidious because metal parts designed for use well within safe mechanical limits may fail without warning.

Machining Alloys (cont.)

ments carried out under the supervision of our Metallurgical Laboratory have shown interesting results regarding the influence of various cooling mediums on machinability.

Exceptionally good results have been obtained from soluble oils. These should be of the best quality and thinned with 15-30 parts of water to get good cooling effect.

For conditions where soluble oils are not desirable, sulphur-base mineral lubricants, thinned with kerosene or Mineral Seal oil to have a viscosity of 100-110 Saybolt seconds have proven satisfactory.

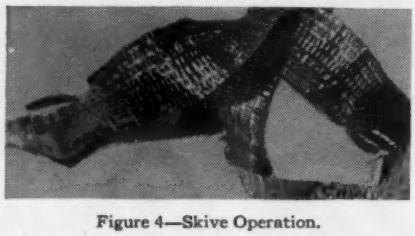


Figure 4—Skive Operation.

Thorough study of the physical requirements of a part component which is machined on automatics or turret lathes, in the light of materials available, and a complete investigation of the relative machinability of various alloys can be the means

Figure 5—Drill Operation.

of producing parts of high quality and relatively low cost.

Bridgeport's revised Duronze Manual contains 80 pages of charts, tables and the latest specifications for high-strength silicon-aluminum bronzes and silicon bronzes manufactured under the trade name of Duronze. Write for your copy today on company stationery.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

High-Pressure Asbestos Gaskets for handholes, manholes and tube plates of boilers and other apparatus subject to heat and pressure are claimed to provide exceptional resilience and compressibility. Each gasket is handblocked to accurate size and the seam is on the outside: they are made from brass wire inserted asbestos yarn, woven into strong cloth, coated and cemented with a heat-resisting compound, folded and pressed into shape. **No. 648**

A New Engraving Tool will permanently engrave letters, numerals or symbols of identification on any surface of any material, according to the manufacturers. It is equipped with a standard alloy bit for surface hardnesses under Rockwell-50C, and diamond-tipped bits are available for harder surfaces. 7200 power strokes per minute are claimed, and the length of the stroke is adjustable between zero and one-eighth inch. **No. 649**

A New Flaring Tool for seven tube sizes (1/8", 3/16", 1/4", 5/16", 3/8", 7/16" and 1/2") is announced. The extent of the flare is controlled to prevent over-flaring, crystallization of the tube or splintering of the flared edge. It is operated with thumb and forefinger pressure. **No. 650**

"Cartridge-Tapping", a patented method by which a hard loosely fitted insert, known as a "tap-cartridge" is placed in the hole, is said to eliminate the difficulties created by chips in cutting internal threads in tapping blind holes. By this means, the chips are removed as rapidly as they are formed until the tap has almost reached the bottom depth, and the remainder of the chips in the flutes of the tap are removed when it is withdrawn. **No. 651**

A Master Coil With Removable Inserts is reported to eliminate coil changing in setting up Thermonic equipment for induction heating applications. The standard master coil set consists of two master coils and forty-eight inserts, accommodating round stock ranging from 1/8" to 3". These inserts can be changed in a matter of seconds. **No. 652**

An Improved Boring Bar, said to eliminate chatter and increase production, is available in two standard sizes having head diameters of 2 and 3 1/2". It is of heavy construction and is provided with precision micrometric blade adjustment. Regular blades are made in sizes for precision boring or facing work from 1 3/4 to 12 1/2 inches in diameter. A small tool adapter permits boring holes down to 1/4 inch in diameter. **No. 653**

BRASS, BRONZE, COPPER, DURONZE, NICKEL SILVER, CUPRO NICKEL

Warehouse Service in Principal Cities

STRIP AND SHEET—For drawing, stamping, forming, spinning. Leaded alloys for machining, drilling, tapping. Silicon bronze, phosphor bronze for corrosion resistance. Alloys suitable for springs. Engravers' copper and brass.

WIRE—Cold Heading alloys for screws, bolts, nuts, nails, fastenings, electrical connectors, Phono-Electric trolley and contact wires.

ROD—Alloys for screw machine operation. Duronze III high strength, corrosion-resistant, good for machining and hot forging. Hot forging and cold heading alloys. Welding Rods.

TUBING—For miscellaneous fabrication. For condensers and heat exchangers. For water, air, oil and hydraulic lines.

DUPLEX TUBING—for conditions too severe for a single metal or alloy.

PIPE—Brass and copper for plumbing.

FABRICATED GOODS—Plumbing brass goods. Radiator air valves. Aer-a-sol insecticide dispensers. Automobile tire valves. Copper covered ground rod.

TECHNICAL SERVICE—Staff of experienced, laboratory-trained men available to help customers with their metal problems.

WAREHOUSE SERVICE—Warehouse and jobbers stocks available for prompt delivery in principal cities.

TECHNICAL LITERATURE — Manuals and handbooks available for most products.

"Bridgeport" BRASS

BRIDGEPORT BRASS

BRIDGEPORT BRASS COMPANY, BRIDGEPORT 2, CONN. • ESTABLISHED 1865

Announcing

THE G-E ARMOR-CLAD ELECTRODE HOLDER

(Cat. No. 279X17)

Featuring Operator Safety

- ★ COMPLETELY INSULATED
- ★ PROTECTED INSULATION
- ★ THREADS CARRY NO CURRENT
- ★ COOL AND COMFORTABLE

ELECTRODE SLOT
holds electrode firmly at proper angle

ALUMINUM SHEATH
protects insulation and resists weld spatter

PUSH-UP ROD
A slight twist of the hand tightens electrode, gives a firm "cushion grip." Threads do not carry current

HANDLE
is light in weight and comfortable to the grip. A twist of the handle releases electrode

SOLDERED CABLE CONNECTION
assures good electrical contact, resulting in a cool handle

HERE is an electrode holder *designed from the operator's point of view.* It is light in weight, amazingly cool in operation, and provides a new degree of safety. The head of the holder is completely enclosed in a sheath of aluminum armor to protect the insulation and to eliminate danger of accidental contact with the welding circuit. Spatter won't stick to this aluminum sheath—the holder stays clean, lasts longer.

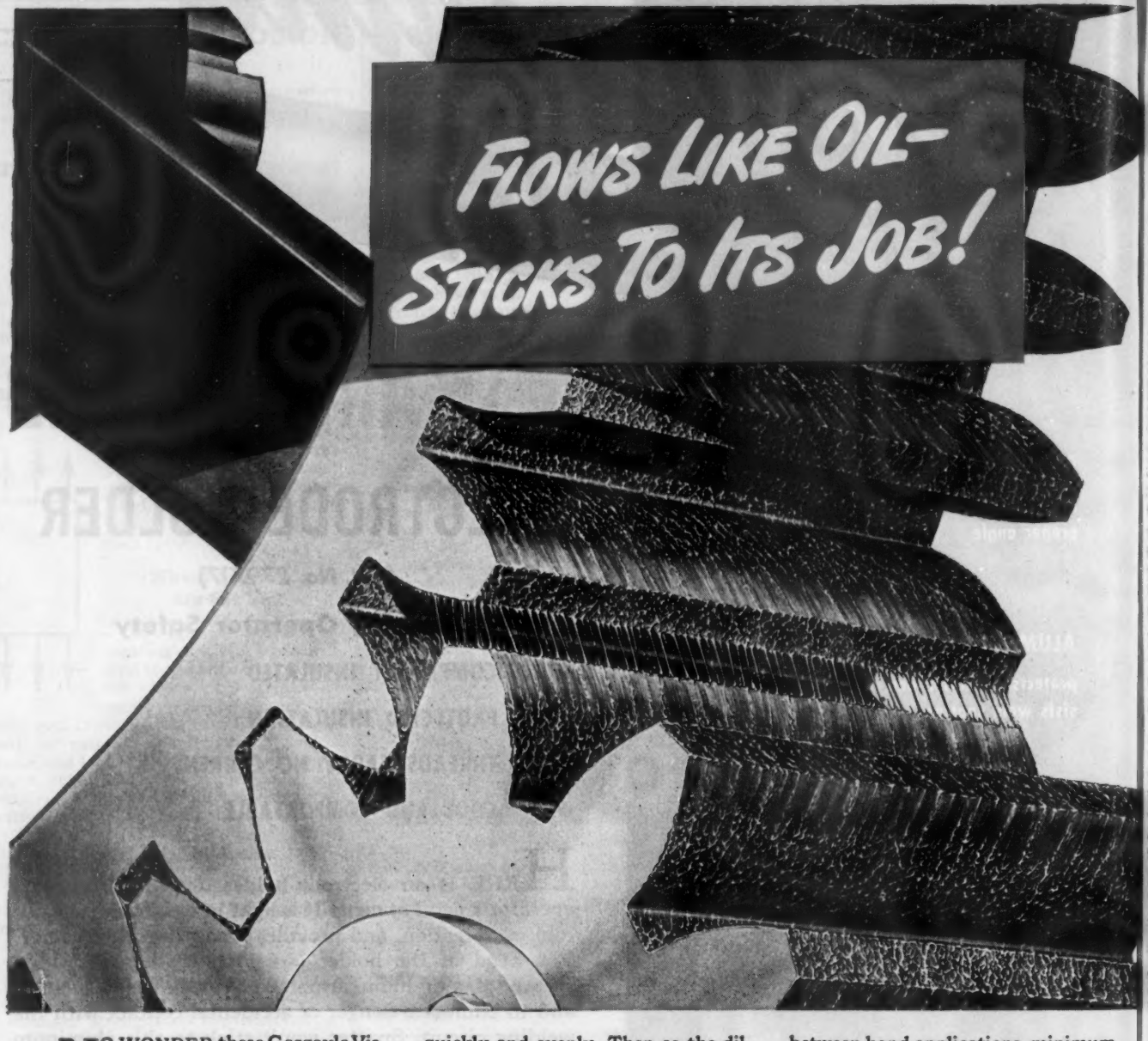
Weighing only 15 ounces, this holder is compact, easy to use—and so precisely balanced that operator fatigue is materially reduced. Electrodes can be changed by a slight turn of the handle—and they can be melted down to a short stub end without gumming the holder with spatter.

Even with all of these safety and operating advantages, the new G-E Armor-Clad holder costs no more than conventional types. Order one today and let your own tests prove its safety and operating efficiency. Simply contact your G-E arc-welding distributor, or write to General Electric Company, Schenectady 5, N. Y.

Buy all the BONDS you can—*and keep all you buy*

GENERAL ELECTRIC

Protect your Open Gears with this Black Magic that . . .



NO WONDER these Gargoyle Viscolite Fluids are called "Black Magic"! Here's the magic they work:

Containing a volatile, non-inflammable diluent, they flow like oil without the necessity of heating. Thus, they can be painted on with a brush, poured from a can or applied with drip-oilers or mechanical force-feed lubricators.

Once on the gears, they distribute quickly and evenly. Then as the diluent evaporates, the remaining product forms strong, viscous, adhesive films that resist rupture, cushion shock loads, promote quiet operation.

As fluids, the Viscolites are easily applied—without waste. As adhesive films they minimize loss from the wiping, squeezing actions of meshing teeth. This permits long intervals between hand applications, minimum rates of feed with automatic oilers.

Get "Black Magic" for maximum protection of your open gears.

SOCONY-VACUUM OIL CO., INC.
Standard Oil of N. Y. Div. · White Star Div. · Lubrite Div. · Chicago Div. · White Eagle Div. · Wadhams Div · Magnolia Petroleum Co. · General Petroleum Corporation of California.

GARGOYLE
Lubricants

SOCONY-VACUUM'S 5 Steps to Lower Production Costs.

1. Lubrication Study of Your Entire Plant
2. Lubrication Schedules and Controls
3. Lubricant Storage and Handling System
4. Skilled Engineering Counsel
5. Progress Reports of Benefits Secured

TUNE IN "INFORMATION PLEASE"—MONDAY EVENINGS, 9:30 E.S.T.—NB

The Ringmaster Knows—

The circus depends on the Ringmaster for his knowledge of showmanship. But industry depends on a different "ring-master" for making rings, hoops and bands—a ring-master that knows how to make such products perfectly at lowest cost. This different "ring-master" is The Cleveland Welding Company . . . specializing in circular, rolled and welded steel products such as gear blanks, rims and such intricate shapes as the product shown at the left.

Over 30 years of specializing in rings have given this concern a thorough *know how* on circular, welded steel products . . . highly specialized equipment and a complete metallurgical laboratory round out the combination of factors that usually bring costs down, at the same time maintaining highest quality. If your need is for rings, circular bands, truck or tractor rims in quantity, get in touch with us.

THE CLEVELAND WELDING COMPANY
West 117th Street at Berea Road • Cleveland 7, Ohio

Is your office full of "SPLIT PERSONALITIES"?

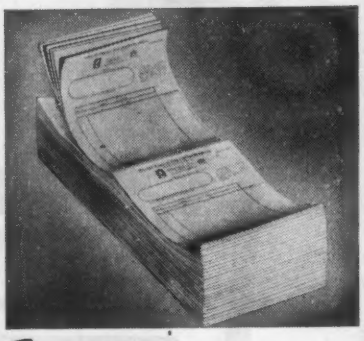
• Ten to one it is! For if your employees must spend time doing unnecessary routine jobs trying to get ready to work—you have "split personalities"—employees forced to split your time and their ability between jobs that matter and unproductive paper rustling.

The cause? Often it's the forms used. Old-fashioned forms that haven't progressed with modern business efforts. Forms that require handwork, carbon stuffing, positioning and other time-wasting jobs that should have been eliminated by design.

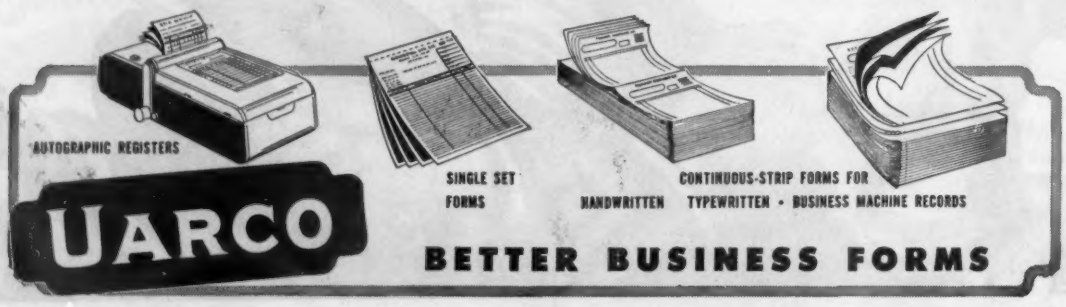
Too often, forms are regarded as mere adjuncts to routine. If this is your case, check the forms you use. Then you may be interested in what UARCO has to show you. For UARCO has made a science of creating better forms . . . forms for the individual business that pay off in savings of time and money . . . forms that simplify and speed work.

Spend a half hour with a UARCO representative. You'll be amazed at the substantial saving of time the right form will bring you. Call in today—or write.

UNITED AUTOGRAPHIC REGISTER COMPANY
Chicago, Cleveland, Oakland • *Offices in All Principal Cities*



For instance, **UARCO Multi-fold Carbon Set forms. These forms can be used in regular billing and bookkeeping machines, or can turn any standard office typewriter into a continuous forms machine. They are perfectly aligned—carbon filled—consecutively numbered. This particular form offers amazing flexibilities of uses—provides legible, clean copies. For further information, write today.**



Hansen air hose couplings keep down production costs by saving time, effort and air and also increase production considerably by saving the operator much time and many steps. The hundreds of thousands of Hansen couplings now in daily use on tools and equipment of all kinds is concrete evidence of their remarkable efficiency, performance and economy. Their adaptations are numerous and varied in many fields. Every day new applications are found for Hansen couplings, some on tools, others as part and parcel of various pieces of equipment, both large and small. Their simplicity in operation and absolute dependability make them a practical and efficient addition to any piece of equipment. To connect the Hansen air hose coupling you merely push plug into socket, coupling is connected and immediately the air is automatically turned on. To disconnect, slide sleeve back with thumb, coupling is disconnected and air is automatically turned off. They will handle pressures from 2 ounces to over 10,000 pounds without leaking.

There's a Hansen Coupling made for air, oil, grease, oxygen, gasoline and acetylene and they come in a wide range of sizes . . . Write for free industrial catalog.

THE HANSEN MFG. CO.

786 EAST 27th STREET • CLEVELAND, 14 OHIO

Streamlined for Action!

Fire engines of the future, so designers tell us, will be ultra-modern in design and efficiency, incorporating many new features. Aluminum and magnesium will play a vital part in many of the post-war designs now on drawing boards throughout America. Their use eliminates weight—reduces operating costs—and adds greatly to eye and sales appeal. If your product now uses—or can use—these versatile light alloys, the Bohn Engineering staff would like to discuss with you their many outstanding advantages.

BOHN ALUMINUM AND BRASS CORPORATION
GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT 26, MICHIGAN
Designers and Fabricators
ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

BOHN

RUST S-TEALS MONEY

Stop it!

Those millions of dollars stolen annually by rust's scaly fingers . . . why let them be your dollars? Stop the rust thief in your plant!

Sinclair preventives that helped solve the war's tremendous rust problems are available to end *your* rust troubles. Whether it be protection for

- machinery in regular operation,
- machinery in short-time or extended storage,
- machinery in transit,
- piping, shafting, etc., exposed to corrosion,

there's a Sinclair *war-tested* preventive that *stops* rust . . . extends equipment durability . . . lengthens the life of metal installations.

Sinclair rust preventives are easily applied, easily removed – and they protect both internal and external surfaces.

Write us for information about application of Sinclair Opaline* RP Oils, and Sinclair Rust-O-Lene* rust preventives to your problems.

*Reg. U. S. Pat. Off.

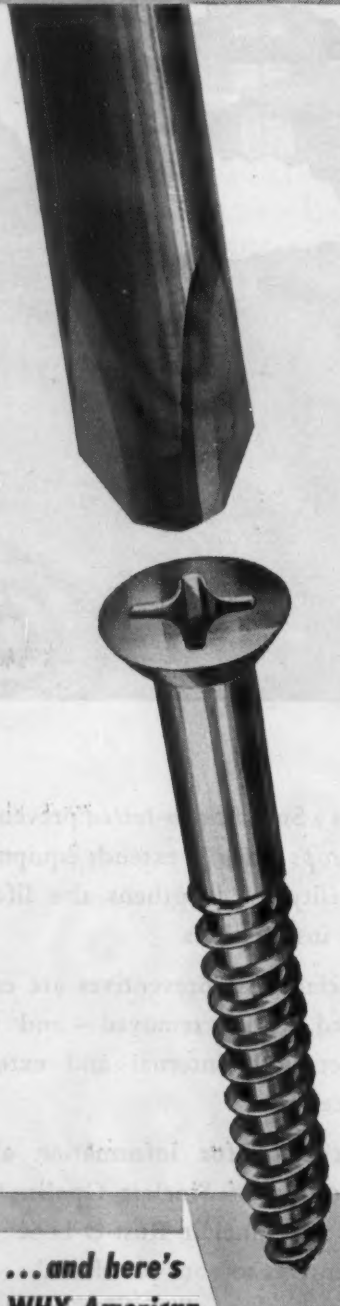
SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

4 INSPECTIONS!

That's why Screw and Bolt Buyers Say:

"AMERICAN brand is 100% OK!"



1. Raw Material Inspection: Every month, American buys hundreds of miles of steel, brass, bronze, and everdur. And every lot is checked for quality before going into production.

2. Process Inspection: Product-samples are checked every few minutes to make sure that machines are maintaining accuracy on every process . . . heading, slotting, shaving, threading.

3. Head, Thread & Point Inspection: Moving along on conveyor belts, screws are individually checked to make sure there are no burred heads, drunken threads, or dull points.

4. Automatic Weigh-Count: Each newly filled box of screws is weighed against a counted gross, to make sure that there are at least 144 perfect American Screws in every gross-box.

American's modern, high-speed manufacturing methods . . . checked by these four inspections . . . are easy-to-see reasons why more and more screw and bolt buyers are marking their orders: "American brand . . . don't substitute."

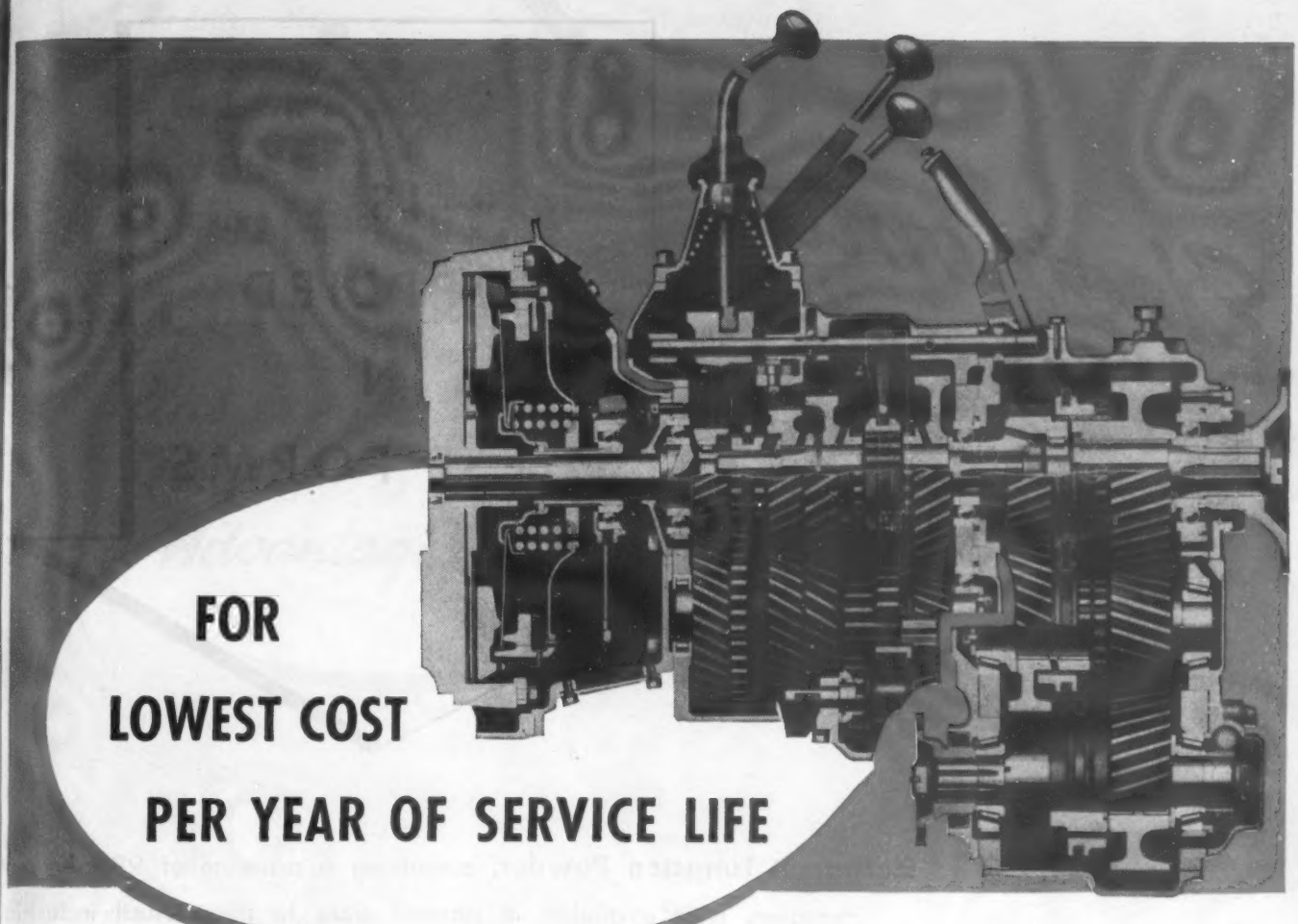
AMERICAN SCREW COMPANY
PROVIDENCE 1, RHODE ISLAND
Chicago 11: 589 E. Illinois Street
Detroit: 502 Stephenson Building

Here's why you get a Higher "Perfection-Percentage" in every order for American Phillips Screws

...and here's WHY American Phillips Screws COST LESS on any Screw Driving job

1. Faster Starting—One hand holds driver, other holds work. No wobbling, no dropped screws. Phillips screw and driver remain as one self-aligned unit until screw is driven.

2. Cleaner Fastenings—*every time.* No slanted screws to back out. No gouged work-surfaces, or burred screw-heads. Even unskilled workers get skilled results right from the start.



FOR LOWEST COST PER YEAR OF SERVICE LIFE

—no other material can equal *ALLOY STEELS*

You just can't beat alloy steels for length of service life. They permit engineers to develop longer-lasting designs and assemblies which continue their superior performance under adverse conditions long after ordinary steels have worn out or failed.

That's why they cost less per year of service life, even though their first cost may be higher than that of less efficient grades of steel. And that's why you should use alloy steels for gears, shafts, bearings and shifting mechanisms, as shown above, and for all other vital operating parts of your product.

Alloy steels have other qualities which recommend them for your use, too. Their high strength-to-weight ratio permits the use, with safety, of lighter equipment and smaller sections. Their super-toughness provides protection against severe shocks, reversal of stresses or overloading. Their uniform hardness means reduced wear.

Republic—world's leader in the production of alloy steels—is ready NOW to assist you in the most efficient and most economical application of these fine steels. Write to—

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic
ALLOY STEELS

Other Republic Products include Carbon and Stainless Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Electromet Tungsten

IS SUPPLIED IN THESE FORMS

Electromet Tungsten Powder, containing a minimum of 99 per cent Tungsten. It is available in particle sizes to meet usual industrial requirements.

Electromet Ferrotungsten, containing from 70 to 82 per cent Tungsten. It is supplied in suitable crushed sizes for steelmaking.

Electromet Calcium Tungstate of high purity, now available for use in place of natural ores. It contains a minimum of 50 per cent Tungsten and is available in small briquet or nugget form, packed in bags containing 10 pounds of Tungsten . . . a convenient form for furnace addition.

If you have a problem in connection with the use of Tungsten, call on us. Our staff of competent metallurgists are prepared to offer on-the-job assistance in the use of Tungsten and the other Electromet ferro-alloys and alloying metals.

BUY AND HOLD UNITED STATES VICTORY BONDS AND STAMPS

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals
are sold by Electro Metallurgical Sales Corporation, and
Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Electromet
Trade Mark
Ferro-Alloys & Metals

"Electromet" is a trade-mark of Electro Metallurgical Company

IN Forgings YOU GET MAXIMUM METAL QUALITY Plus These Advantages

Valve Forging for High Pressure Service.
1. High tensile and impact strength obtained through controlled concentration of grain structure and fibre-like flow lines.
2. A correctly proportioned combination of physical properties to meet a specific service condition.
3. Reduction of dead weight; maximum strength and toughness in lighter sections; thicknesses
DEAD WEIGHT
4. Reductions in cost at point of assembly due to less time required to machine and finish, and fewer rejects.
5. Rapid assembly of complex parts by welding, because forgings provide welding adaptability of widest range.
6. A reduction of accidents to
and machines, because forgings
vide a greater margin of safe
7. Controlled concentration of fi
like flow line structure of metal
points of greatest shock and str

orging metals in closed impression dies develops maximum metal quality. A product fortified with e metal quality found in forgings outperforms other products. A recheck of every stressed part hether of simple or complex design, against the seven advantages that forgings offer may reveal e possibility of further strengthening a part or a product to give longer service life; to lessen eight; to reduce the cost of machining and finishing; to speed up sembly. Consult a forging engineer connected with your source of pply about the wide range of combinations of quality advantages at are available in forgings, and how you can obtain metal quality the exact degree required for a specific condition. Forging techniques quired to forge so-called "impossible-to-forge-designs" are now ailable for the production of peacetime forgings.

DROP FORGING ASSOCIATION

605 HANNA BUILDING • CLEVELAND 15, OHIO

DROP FORGING ASSOCIATION
605 Hanna Building • Cleveland 15, Ohio

☐ Booklet on "Metal Quality—Hot Working Improves Properties of Metal."

☐ "Drop Forging Topics," issued ten times a year.

Name ..... Position .....

Company .....

Address ..... City ..... State .....

JEFFREY CHAINS

IN THE STEEL MILL

CROP CONVEYORS

Carrying white hot, large and small, irregular and jagged crops is the 24-hour lot of a crop conveyor. While it conveys only waste material, its job is of prime importance in the cycle of continuous steel production. ● With full knowledge of this service demand, Jeffrey builds its Vulcan chains, methodically . . . by careful selection of materials, precision manufacture, and uniform heat treatment . . . to impart higher strength, greater wear resistance, superior performance. ● Check the extra economic value of Vulcan chains in quality and construction. That same degree of superiority is found in all Jeffrey chains applicable to steel mill service.

THE JEFFREY MANUFACTURING COMPANY
Established 1877
889-99 North Fourth St.
COLUMBUS 16, OHIO

Jeffrey

BROACHES—Master tools of Mass Production—

Broach Heat Treating Furnace, Commercial Steel Treating Corp.

Broaches, courtesy of Detroit Broach Co., Inc.

PRECISION HEAT TREATED with GAS

at Detroit's

Commercial Steel Treating Corporation

In the Detroit area, where mass production of metal parts has probably achieved heights unsurpassed in the world, it is estimated that one-third of the broaches made in this country are produced. Used to finish steel parts in mass production, the broach has accomplished wonders on the production line and must be carefully heat treated to help effect such results.

For instance, it cuts "keyways" in gears, "splines" in propeller hubs, and rifling in machine gun barrels. When first applied to the latter task, time was cut from six days to eight hours. Distortion can not be tolerated in the heat treated broach and uniform hardness must be secured—an obvious necessity in a tool that must cut many steel parts at a time.

In the Gas fired heat treating furnaces of Commercial Steel Treating Corporation, it was found that close accuracy of heat control so essential to best results in the finished product, was achieved, while absolute cleanliness prevailed. Customers of the plant are well satisfied with the Gas heat treated broaches from these furnaces.

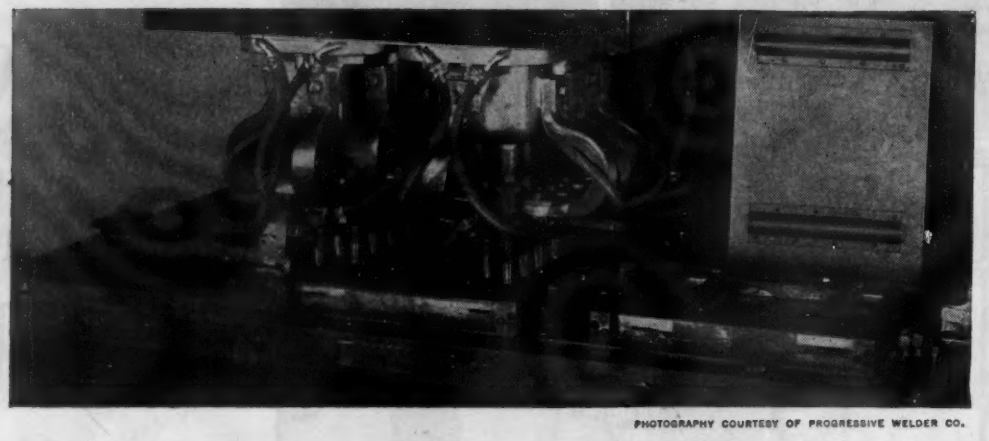
You may never heat treat broaches but you can successfully utilize the accurate, automatic control that Gas brings to broach heat treating—no matter what your heat treating problem. Why not consult the Industrial Engineer of your local Gas Company who has valuable data on the newest Gas heat treat operations.

AMERICAN GAS ASSOCIATION

INDUSTRIAL AND COMMERCIAL GAS SECTION

420 LEXINGTON AVENUE, NEW YORK, 17, N.Y.

16 Spot Welds in One Operation 300 Assemblies an Hour...with



PHOTOGRAPHY COURTESY OF PROGRESSIVE WELDER CO.

MALLORY Spot Welding Tips

MULTIPLE spot welding speeds production of reinforced metal box ends, as this modern welder fastens two channels to a flat plate in one operation—and produces 300 assemblies an hour!

Two channels are placed in a jig, with the flat steel plate on top. The jig then moves under a battery of 16 water-cooled Standard Mallory Spot Welding Tips, which fasten both channels to the plate simultaneously, eight welds per channel. With two jigs shuttling back and forth, assemblies are completed at the rate of one every 12 seconds.

Maximum production is assured by the use of standard spot welding tips made of Mallory 3* Metal. These alloy tips avoid excess "mushrooming", joining thousands of steel parts with sound welds at a minimum of down time for dressing. Both tips and holders are efficiently water cooled, to lengthen tip life and improve weld quality.

Mallory provides a complete line of standard spot welding tips and water-cooled holders, in addition to manufacturing all special types of seam welding wheels, flash, butt and projection welding dies for specific applications. These electrodes are used for the resistance welding of metal products of carbon, alloy and stainless steels, plated metals and aluminum.

Write today for free catalogs describing Mallory electrodes and holders. Mallory metallurgists and engineers will gladly help you with any specific resistance welding problem.

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

Useful Handbook—

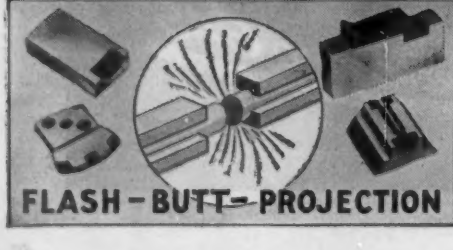
Complete manual on resistance welding methods, machines and materials is the improved, revised and expanded Mallory Resistance Welding Data Book (3rd Edition). Free to those using resistance welding, when requested on company letterhead. Price to students, libraries and educational institutions: $2.50 per copy, postpaid. Board covers, 8½ x 11", 160 pages.

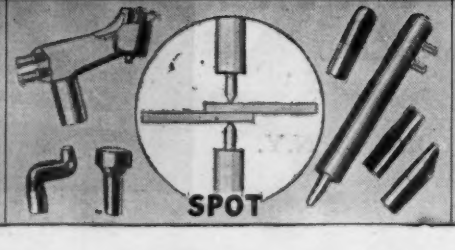
In the United Kingdom, Made and Sold by Mallory Metallurgical Products, Ltd., London.

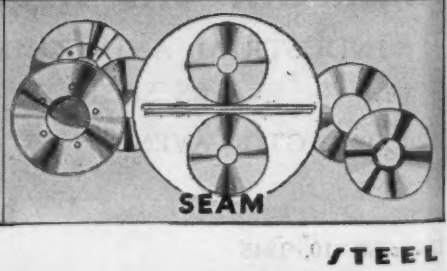
*Registered trademark of P. R. Mallory & Co., Inc., for copper alloys.

P.R. MALLORY & CO. Inc

MALLORY Standard Resistance Welding Electrodes







MASTER GEARHEAD MOTORS

COST REDUCED by the elimination of bearings, couplings, chains, and sprockets, gear trains or separate gear reducers . . . only one unit to mount . . . lower assembly costs.

COMPACT. High reduction ratios secured in small space by using heat treated special alloy steels for both splined shafts and gears.

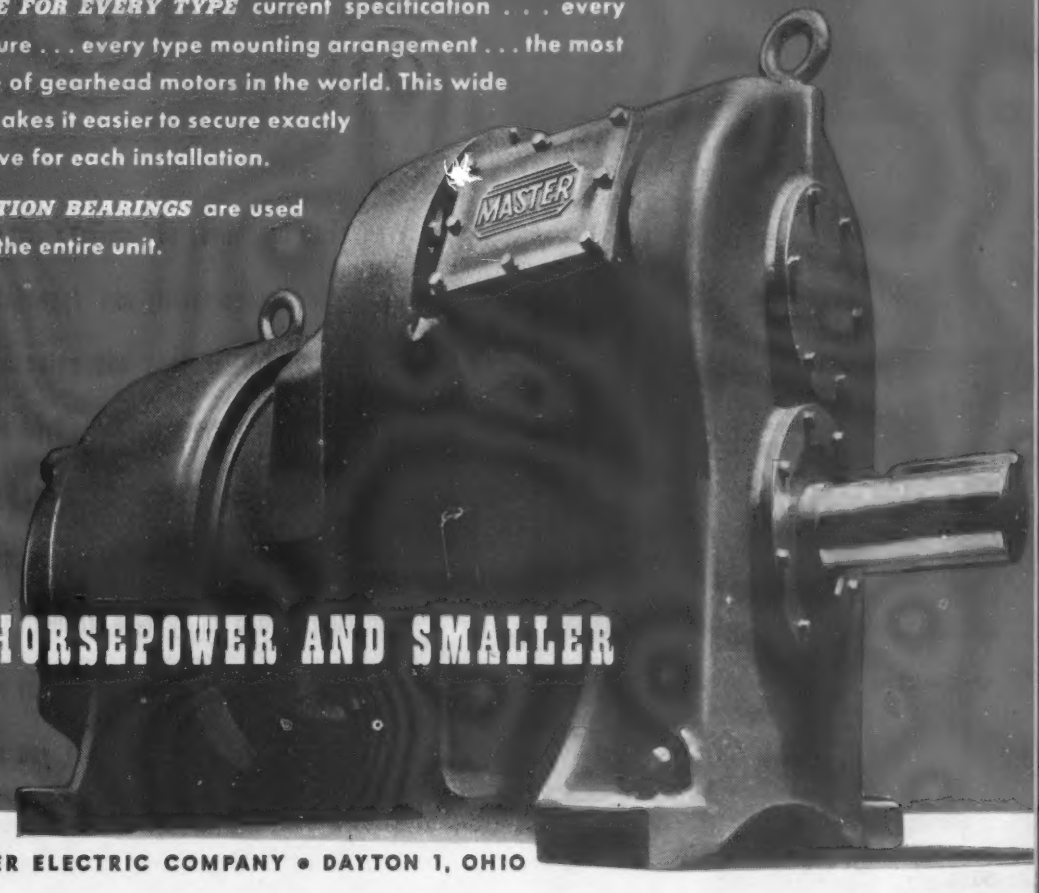
HIGHER EFFICIENCY than other types of slow speed drives . . . only 2 percent power loss in each stage of gear reduction, in parallel shaft types.

SIMPLIFIED DESIGN. More compact . . . less weight . . . permanent alignment . . . fewer moving parts . . . high efficiency . . . longer, reliable, trouble-free operation.

INTEGRAL CONSTRUCTION. Both motors and gears are designed, built, and guaranteed by one organization as a well balanced power package.

AVAILABLE FOR EVERY TYPE current specification . . . every type enclosure . . . every type mounting arrangement . . . the most flexible line of gearhead motors in the world. This wide flexibility makes it easier to secure exactly the right drive for each installation.

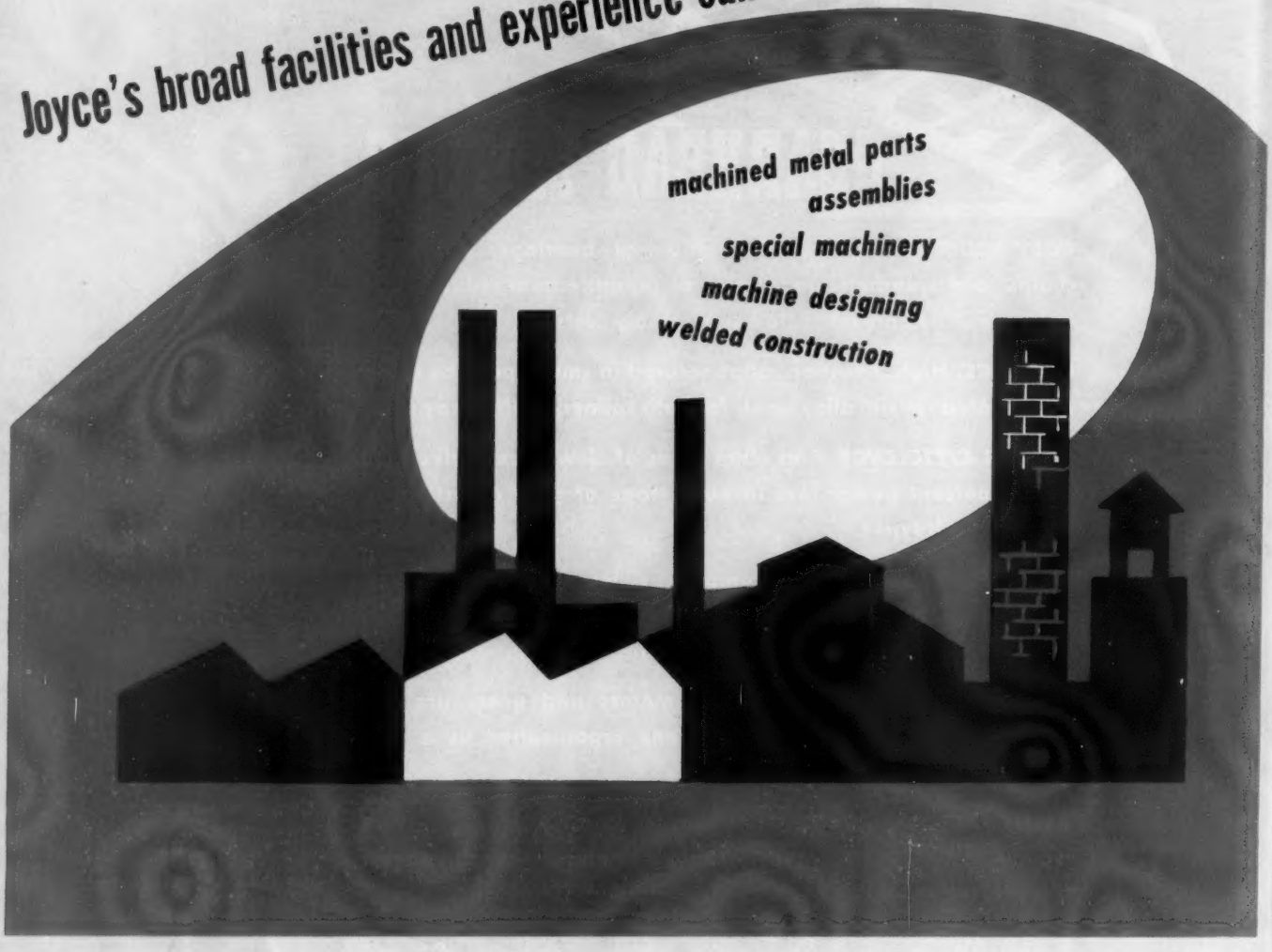
ANTI-FRICTION BEARINGS are used throughout the entire unit.



100 HORSEPOWER AND SMALLER

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

Joyce's broad facilities and experience can save you time and money in

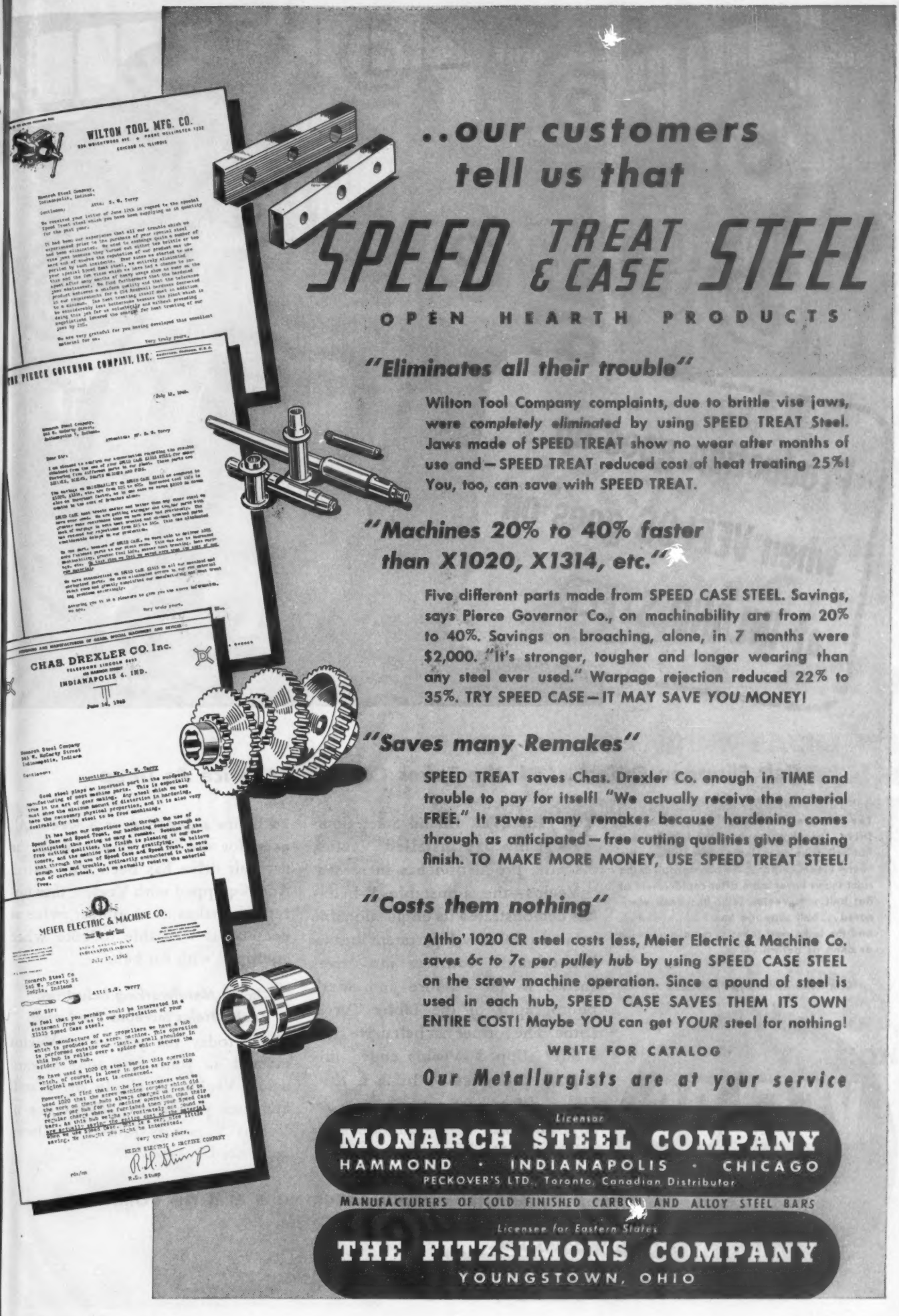


JOYCE
Machine Company
FRANKFORD • PHILADELPHIA
*
MANUFACTURERS OF PRECISION PARTS
AND SPECIAL MACHINES
FOR ALL KEY INDUSTRIES

SPECIALIZING IN PARTS-PRODUCTION FOR PEACETIME PRODUCTS

Production executives of America's largest industrial establishments can testify to the versatility and dependability of Joyce service. Our large force of skilled artisans and extensive equipment are ready to go to work for you, whatever the size or type of your problem. If the production of machined metal parts will help speed your product to market . . . if your need is large-scale assemblies . . . if the design and construction of a special machine is called for by some production slow-up . . . Joyce's long experience in serving the rayon, steel and all key industries can help you. A letter, wire or telephone call will bring you quick action—without obligation.

"We've found Joyce a sound choice"



..our customers tell us that SPEED TREAT & CASE STEEL

OPEN HEARTH PRODUCTS

"Eliminates all their trouble"

Wilton Tool Company complaints, due to brittle vise jaws, were *completely eliminated* by using SPEED TREAT Steel. Jaws made of SPEED TREAT show no wear after months of use and—SPEED TREAT reduced cost of heat treating 25%! You, too, can save with SPEED TREAT.

"Machines 20% to 40% faster than X1020, X1314, etc."

Five different parts made from SPEED CASE STEEL. Savings, says Pierce Governor Co., on machinability are from 20% to 40%. Savings on broaching, alone, in 7 months were $2,000. "It's stronger, tougher and longer wearing than any steel ever used." Warpage rejection reduced 22% to 35%. TRY SPEED CASE—IT MAY SAVE *YOU* MONEY!

"Saves many Remakes"

SPEED TREAT saves Chas. Drexler Co. enough in TIME and trouble to pay for itself! "We actually receive the material FREE." It saves many remakes because hardening comes through as anticipated—free cutting qualities give pleasing finish. TO MAKE MORE MONEY, USE SPEED TREAT STEEL!

"Costs them nothing"

Altho' 1020 CR steel costs less, Meier Electric & Machine Co. *saves 6c to 7c per pulley hub* by using SPEED CASE STEEL on the screw machine operation. Since a pound of steel is used in each hub, SPEED CASE SAVES THEM ITS OWN ENTIRE COST! Maybe YOU can get *YOUR* steel for nothing!

WRITE FOR CATALOG

Our Metallurgists are at your service

Licensor

MONARCH STEEL COMPANY

HAMMOND · INDIANAPOLIS · CHICAGO

PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

Production goes up when VEELOS goes on at INLAND STEEL

Belt Slippage Ended . . . Lathe Takes Cut Almost Twice As Deep

The "Before and After" Story of a Belt Drive. The photograph at the left shows a flat belt drive on a Libby Turret Lathe at the Inland Steel Company; the photograph at the right shows turret lathe after replacement of flat belt with Veelos. Idler has been eliminated . . . belt slippage has been ended . . . and the lathe now takes a cut almost twice as deep as before.

Link Construction Ups Production

WHEREVER Inland Steel Company has installed Veelos, machine production has increased.

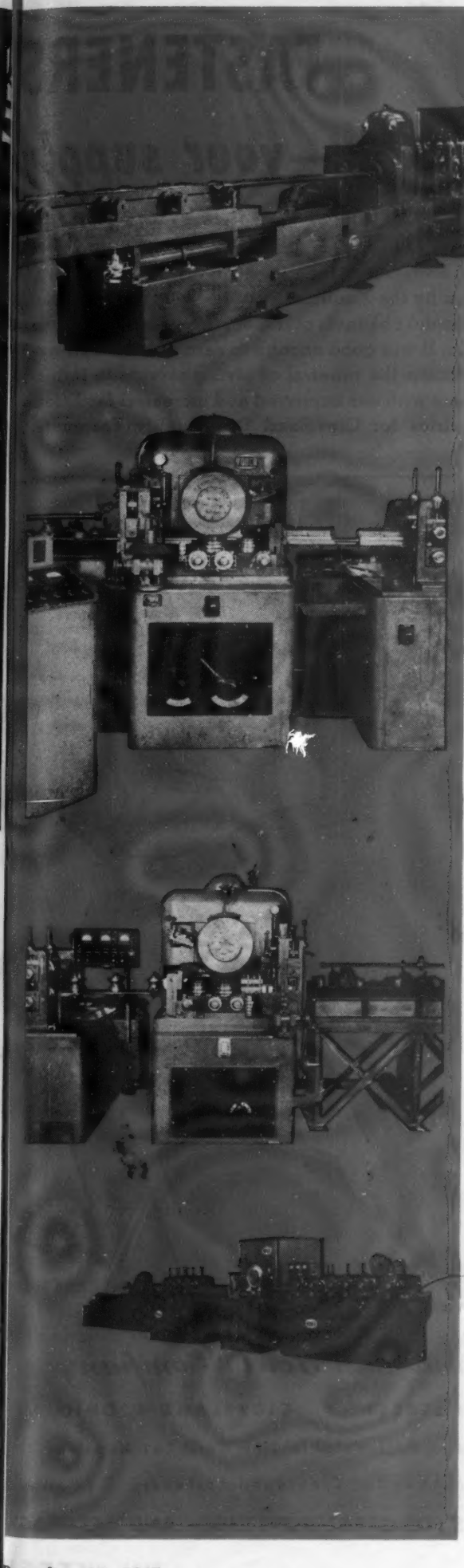
Veelos—the adjustable V-belt—has demonstrated its unquestionable value to Inland department heads. For example, consider the drives shown in the "before and after" photographs of the Libby Turret Lathe. The former flat belt drive constantly slipped. Veelos ended this slippage completely. In fact, *these Veelos drives have not even been readjusted since their installation in May, 1944.* Yet these drives operate 24 hours a day, 6 days a week. All need for the idler shown with the flat belt drive has been eliminated. And, equipped with Veelos, this turret lathe takes a cut almost twice as deep as it was able to take when equipped with flat belt.

In All Metalworking Industries, Veelos Helps Increase Production

Write today for your free Veelos manual as your first step toward using Veelos. A single drive will convince you of the advantages of Veelos . . . just as Inland has been convinced.

VEELOS
THE LINK
V-BELT
Adjustable to any Length
Adaptable to any Drive

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PA.



FOR THE ATTENTION OF :
DESIGN ENGINEERS, MANUFACTURERS.
TUBING BUYERS, IRRIGATION
TUBING SUPPLIERS.

UNITED TUBE CORPORATION OF OHIO

ANNOUNCES

THE OPENING OF A NEW MODERN PLANT

LOCATED AT CLEVELAND, OHIO

WITH OUTSTANDING FACILITIES for the PRECISION PRODUCTION of STEEL and CORROSION RESISTANT

WELDED MECHANICAL TUBING

AND IRRIGATION TUBING

STANDARD SIZES from 3/8" to 4 3/4" O.D.
WALL THICKNESS TO SPECIFICATION

Capacity for Slitting Steel in Coils

UNITED TUBE CORPORATION OF OHIO
2134 WEST 53rd STREET
CLEVELAND, OHIO

CLEVELAND *Top Quality* FASTENERS

. . . turn from Demand to Supply—*your supply*

From the demands of war equipment for our tough high carbon heat treated cap screws and special fasteners we gladly turn to the requirements of normal manufacturing. These same fasteners, made with precision by the Kaufman Double Extrusion Process, are flowing into peaceful channels of trade. More than 90% of our capacity went to war. It was good enough to earn for us the Army-Navy E. But we welcome the renewal of giving service to industrial users everywhere with our improved and increased facilities. Send us your inquiries for Cleveland Top Quality Fasteners.

CLEVELAND *Top Quality* **FASTENERS**

The Cleveland Cap Screw Company

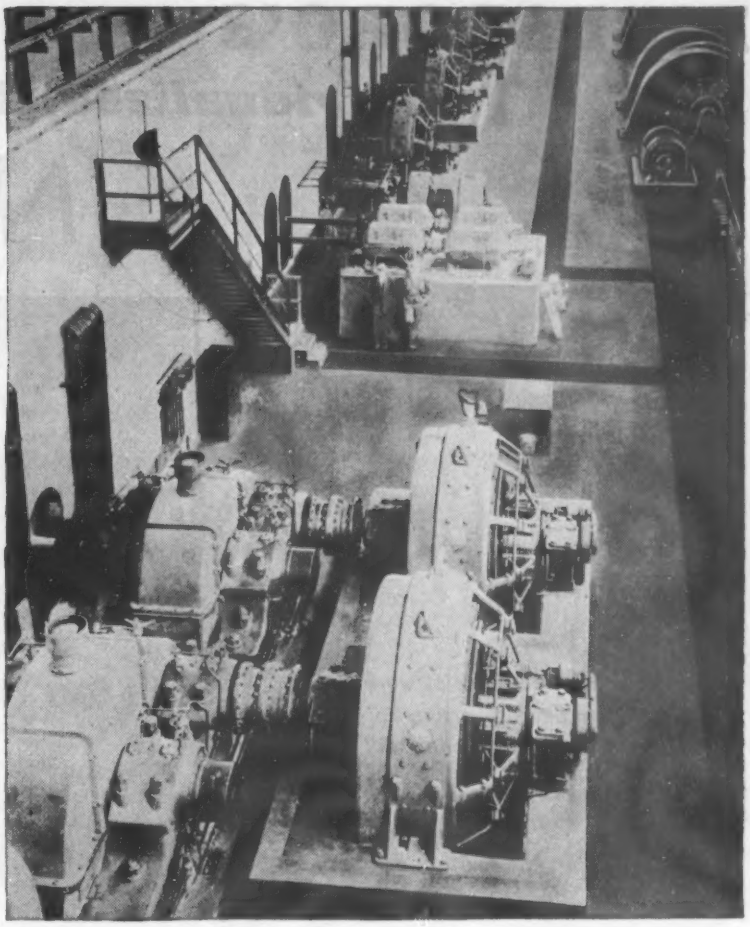
2917 EAST 79TH STREET • CLEVELAND 4, OHIO

Warehouses: Chicago, Philadelphia, New York, Los Angeles

Ask your Jobber for Cleveland Fasteners

MADE BY THE ORIGINATORS OF THE KAUFMAN PROCESS FOR GREATER STRENGTH AND ACCURACY

Danger of Shut-downs Minimized with Fast's Couplings



In Fast's Self-aligning Couplings, the load-bearing surfaces are protected against wear by a positive film of oil. This oil is kept permanently clean by rocking bearings which make precise, metal-to-metal contact and are in the one position where they form a permanent dust and moisture-proof seal. This is an exclusive feature with Fast's Couplings, which are made by the Bartlett Hayward Division of Koppers. In the steel mill shown in this picture, Fast's Couplings are used throughout the hot strip mill.

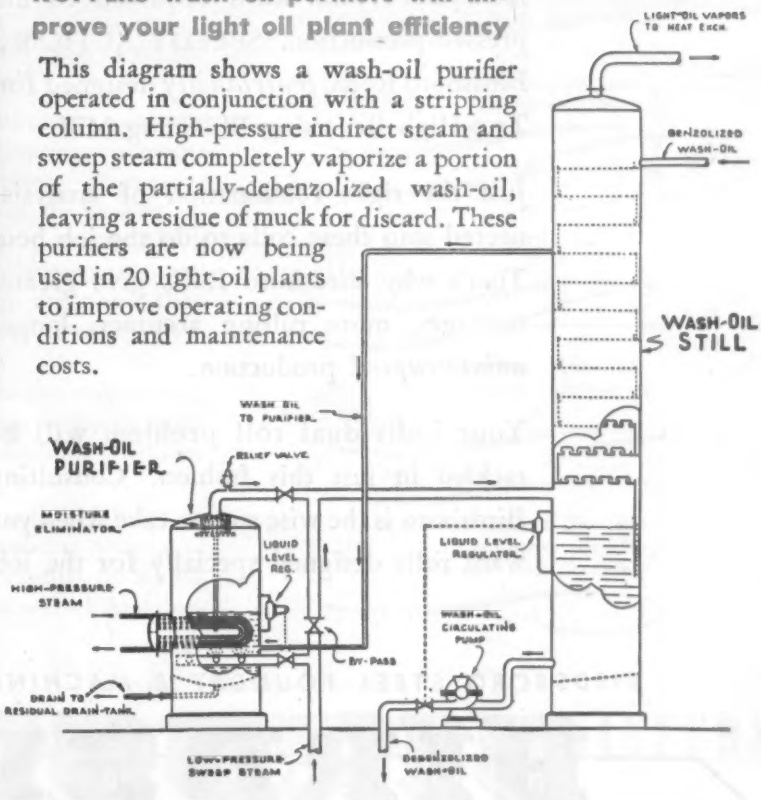
KOPPERS built-up coal tar pitch roofs can be applied over steel decks

The Koppers Roofing Specification Book contains four specifications for applying coal tar pitch roofing over steel decks, with insulation. Two of these are for steep decks and two for flat decks. The specifications also describe the methods of applying the insulation. Send for copies.

Buy Victory Bonds . . . and keep them!

KOPPERS wash-oil purifiers will improve your light oil plant efficiency

This diagram shows a wash-oil purifier operated in conjunction with a stripping column. High-pressure indirect steam and sweep steam completely vaporize a portion of the partially-debenzolized wash-oil, leaving a residue of muck for discard. These purifiers are now being used in 20 light-oil plants to improve operating conditions and maintenance costs.



KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

KOPPERS COMPANY, INC. • KOPPERS BUILDING • PITTSBURGH 19, PA.

BIRDSBORO'S

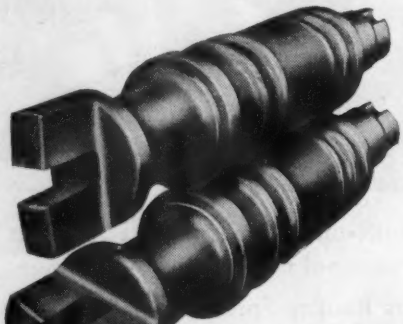
Individualized Roll Service

IN ACTION

Birdsboro Rolls at work in a quick reversing 26" Birdsboro Blooming Mill

ACTION... the kind required to meet the demands of war-pressed production. SPEEDY ACTION... made possible with these Birdsboro Rolls, *individually* designed for use in this Birdsboro Rapid Two-High Reversing Blooming Mill.

Just the right combination of analysis and physicals were engineered into these rolls to do the job best. That's why Birdsboro Rolls give greater tonnages, more rolling accuracy, longer *uninterrupted* production.



Your individual roll problem will be tackled in just this fashion. Consulting Birdsboro is the wise step to take when you want rolls designed specially for the job.

BIRDSBORO STEEL FOUNDRY & MACHINE COMPANY, BIRDSBORO, PA.

BIRDSBORO

ROLLS

GREAT and rapid strides have been made in adapting America's industrial might to peacetime requirements . . . new processes, new production equipment. Soon these great achievements will be revealed . . . in the largest industrial exposition of its kind. This first postwar ASTE exposition will open the door to *New Era* engineering and manufacturing, with every person among the more than 100,000 in attendance having a vital interest in what's new. **This is industry's show for industry!**

Here will be shown the many new designs and engineering projects on which America's new peacetime industry must be built! Manufacturers and industrial engineers will exhibit their latest developments.

The country's leading tool engineers will be there, to attend the Annual Convention of the American Society of Tool Engineers. It is the major postwar opportunity for manufacturers to exhibit their products to all industrial America.

WHERE Public Auditorium Cleveland, Ohio

WHEN April 8-12 1946

WHO Leading Manufacturers and Industrial Engineers

WHY To Exhibit *New Era* Production Equipment and Processes

For full information write to

AMERICAN SOCIETY OF TOOL ENGINEERS

Exposition Committee

1666 PENOBSCOT BUILDING ☆ DETROIT 26 ☆ MICH.

They Knew What They Wanted...

but it took PRESTEEL to find how to make it

Here is a casing for a B-29 *Strato-Heater, an outstanding wartime heating development. The designers furnished a rough drawing and from this meager data, Presteel engineers developed a case made from precision stampings that met all specifications.

This casing had to fit connections with the gasoline heating unit and leads already installed in the fusilage — had to fit perfectly to avoid all vibration. Weighing only 1-lb. 11-oz. the housing contained a unit strong enough with its fan to heat the whole cabin at sub-zero stratosphere temperatures—equivalent to heating a six-room house.

When you specify Presteel stampings they are fully guaranteed by the leading company using controlled press operations. Why not let Presteel handle *your* stamping problems?

*Reg. U. S. Pat. Off. by Sales Corp. of America

WORCESTER PRESSED STEEL CO.

512 Barber Avenue, Worcester 6, Mass.

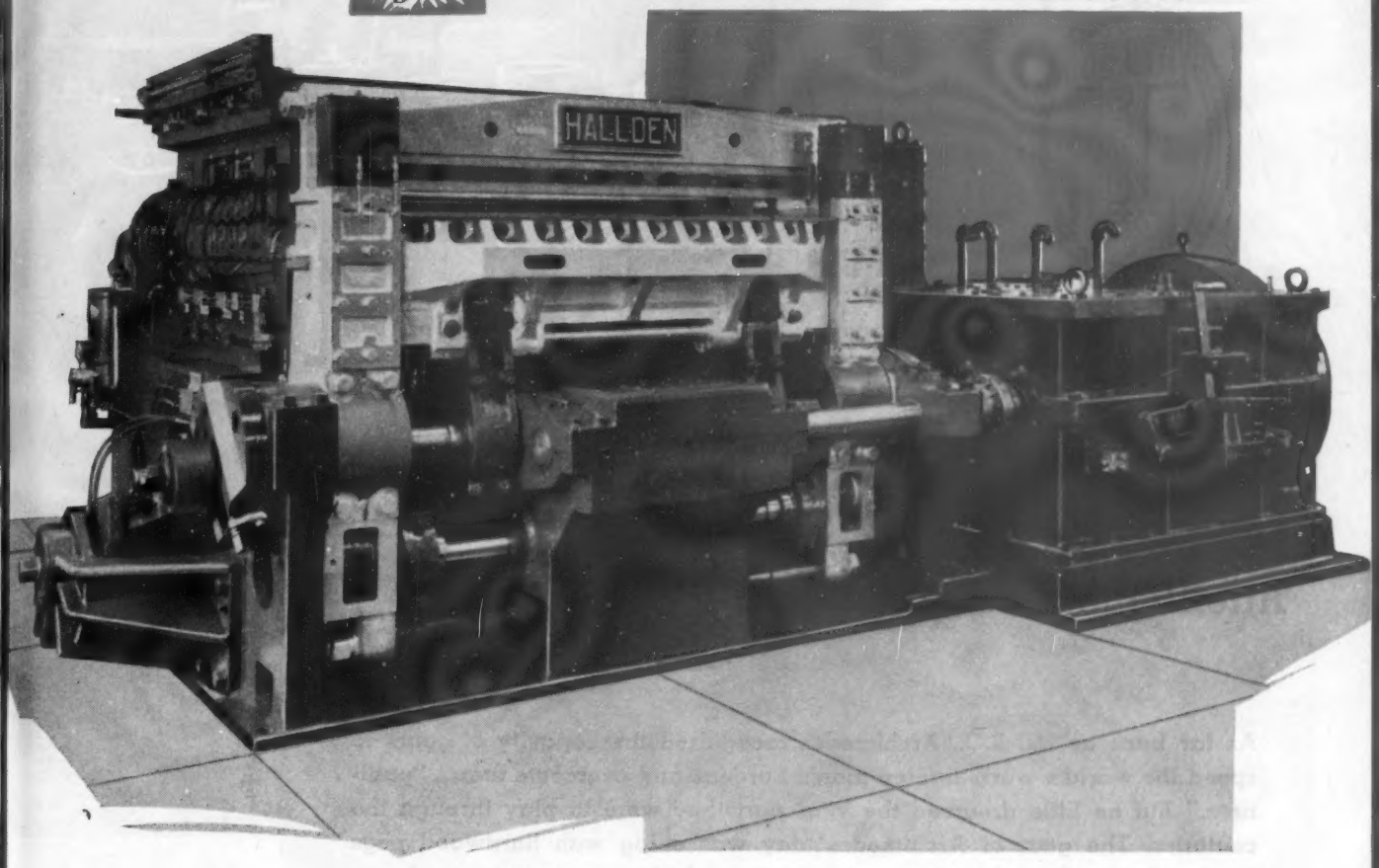
ALLOY STEELS AND OTHER METALS COLD FASHIONED SINCE 1883

Representatives in Alexandria Virginia, Buffalo, Canton Ohio, Chicago, Denver, Detroit, Fort Worth, Indianapolis, Los Angeles, New York, Philadelphia, Syracuse, Toronto

HALLDEN

Automatic Flying
SHEET SHEAR

(GUILLOTINE TYPE)



HIGH TONNAGE
WITH EXTREME
Accuracy
RUGGED CONSTRUCTION
LOW MAINTENANCE
Cost

the **MEAN** *Engineering Company Inc.*

Warren, Ohio . .

Subsidiary Company

THE BRODEN CONSTRUCTION CO., Cleveland, Ohio

SPECIALISTS IN SHEET, TIN AND STRIP MILL EQUIPMENT

"The mark on Finer Gears"

ILLINOIS GEARS

A modern high speed bevel gear generator

THINGS HAVE CHANGED SINCE ARCHIMEDES DAY

As far back as 250 B.C., Archimedes recognized the capacity of gears to speed the world's work, lighten man's burdens and overcome man's "puniness." But he little dreamed the vital part they were to play through the centuries. The gear of Archimedes' day was a log with hardwood pegs inserted for teeth—crude, but workable. Gear design, construction and production have since come a long way. In the last decade, our engineers and craftsmen have given a new meaning to accuracy and soundness in gear making.

Every Illinois Gear must come up to a "Five Star" standard. ★Material is carefully double-checked—you get exactly what you order. ★Cutting is done by highly skilled craftsmen. ★Required accuracy is inbuilt. ★The gear is double-inspected after completion. ★Delivery is as promised.

Many equipment builders have found it most economical to avail themselves of our sincere and conscientious service. Catalog 39 shows our facilities, typical Illinois gears, and gives helpful data for gear users.

ILLINOIS GEAR & MACHINE CO.
Chicago (35), Ill.

ARMY ★★ E ★★ NAVY

ILLINOIS GEAR & MACHINE COMPANY

A Shark at Handling Limestone

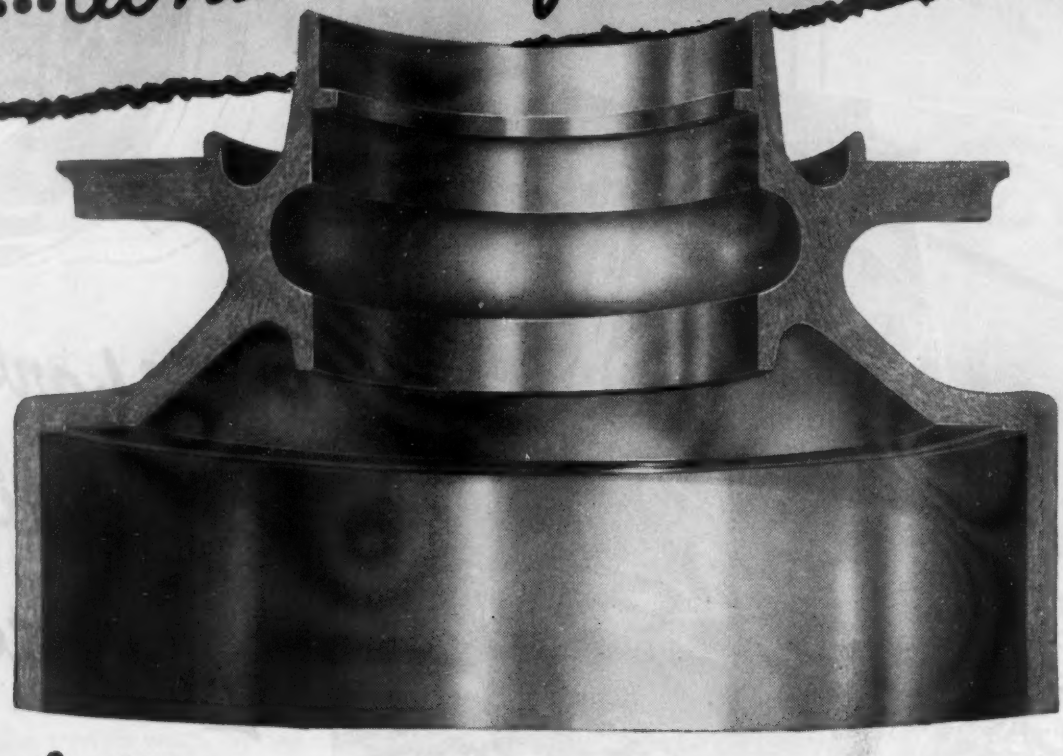
Fitted with "Shark's Teeth," this 2 cu. yd. Single Line Hook-on type bucket makes short work of handling open hearth limestone to the charging boxes . . . No. 3201, like all other Blaw-Knox Buckets, is designed and built for a *specific* purpose—which results in greater efficiency, lower maintenance and longer useful life.

For complete data on the many types and sizes of Blaw-Knox Buckets widely used in steel plants and foundries write for Catalog 2002.

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY
2002 FARMERS BANK BLDG., PITTSBURGH, PA.
NEW YORK CHICAGO PHILADELPHIA BIRMINGHAM WASHINGTON
Representatives in Principal Cities

BLAW-KNOX CLAMSHELL BUCKETS

Problem— Reduce the weight ....don't sacrifice strength



Solution: FORGINGS by PHOENIX

Here again is an illustration of the unusual advantages provided by the drop-forging process. This time it's an airplane starter base. Carefully controlled grain flow affording extra strength at points of greatest stress and strain made possible lighter wall thicknesses. Yet there was no sacrifice of rugged dependability. Result—an important reduction in weight . . . lower machining costs . . . and strength and stamina to spare.

Photomicrograph of an airplane starter base showing lines of flow produced by drop forging

Forgings by Phoenix have provided the solution to hundreds of such problems, enabling manufacturers to improve product quality and materially reduce costs. Perhaps you have such a problem. If so, we'll gladly discuss it with you . . . without obligation.

Forging Division of

PHOENIX MANUFACTURING COMPANY

CATASAUQUA PENNSYLVANIA

Forgings by **PHOENIX**

Starting Its 21ST YEAR on This Job!

When the National Mortar & Supply Co., Gibsonburg, Ohio, purchased this 14-ton, gear drive Plymouth gasoline locomotive back in 1925, it was intended for use in a quarry, handling heavy loads on short hauls. For more than 20 years, it's been doing that job, and has been handling plenty of "extra" work, like car-switching.

This outstanding performance record is the reason why National has added several other Plymouths to its fleet since 1925. And it's the reason why you can look with assurance to Plymouth for the answer to your industrial transportation problem for Plymouth design, materials and craftsmanship combine to provide more tonnage at less cost.

TRACK HAULAGE IS CHEAPER HAULAGE

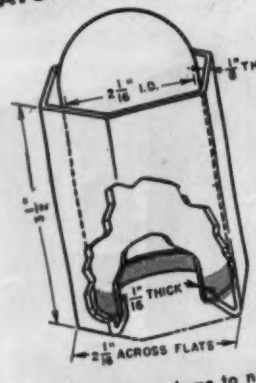
PLYMOUTH LOCOMOTIVES

GASOLINE, DIESEL MECHANICAL AND DIESEL ELECTRIC

PLYMOUTH LOCOMOTIVE WORKS • Division of The Fate-Root-Heath Co., Plymouth, Ohio, U.S.A.

LEAVES FROM THE LEPEL LABORATORIES LOG

LEPEL HIGH FREQUENCY LABORATORIES, INC.
39 West 60th Street New York 23, N. Y.
LABORATORY TEST REPORT
No. 2370



Operation: Braze dome to nose cup
Alloy: Silver Solder Grade 4
Flux: Fluoride
Temp. Limit: Flow Solder
Lepel Unit: 30 K.W. Input
Approx. Temperature: 1250° F
Heating Time: One piece, 13 sec.
4 pieces simultaneously, 55 sec.

Tough Heating Jobs Simplified with Lepel Induction Heating

The illustrations show some of the hundreds of difficult industrial heating problems solved in Lepel laboratories.

Lepel High Frequency Induction Heating Units make simple work of the most complicated heating operations, often performing work impossible by other methods.

Actual heating time is reduced to a matter of seconds.

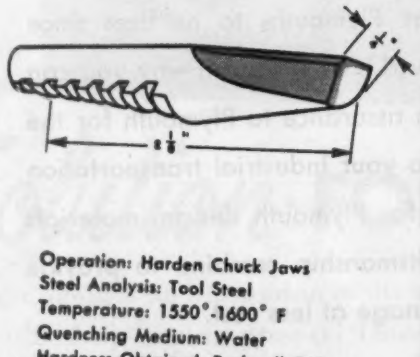
Heat is applied exactly where it is needed — at the exact temperature and for the exact time required.

Any worker, after brief training, can produce consistently good results with Lepel Induction Heating.

Any Lepel Unit can be used without alteration for hardening, annealing, stress relieving, soldering, brazing or melting small charges of common or precious metals.

Put your heating problems up to Lepel laboratories. Send samples and specifications of work to be performed — or ask a Lepel engineer to call.

LEPEL HIGH FREQUENCY LABORATORIES, INC.
39 West 60th Street New York 23, N. Y.
LABORATORY TEST REPORT
No. 1076



Operation: Harden Chuck Jaws
Steel Analysis: Tool Steel
Temperature: 1550°-1600° F
Quenching Medium: Water
Hardness Obtained: Rockwell C60
Depth of Hardness: Approx. 3/32"
K.W. Input: 7½
Heating Time: 10 sec.

LEPEL HIGH FREQUENCY LABORATORIES, INC.
39 West 60th Street New York 23, N. Y.
LABORATORY TEST REPORT
No. 1780

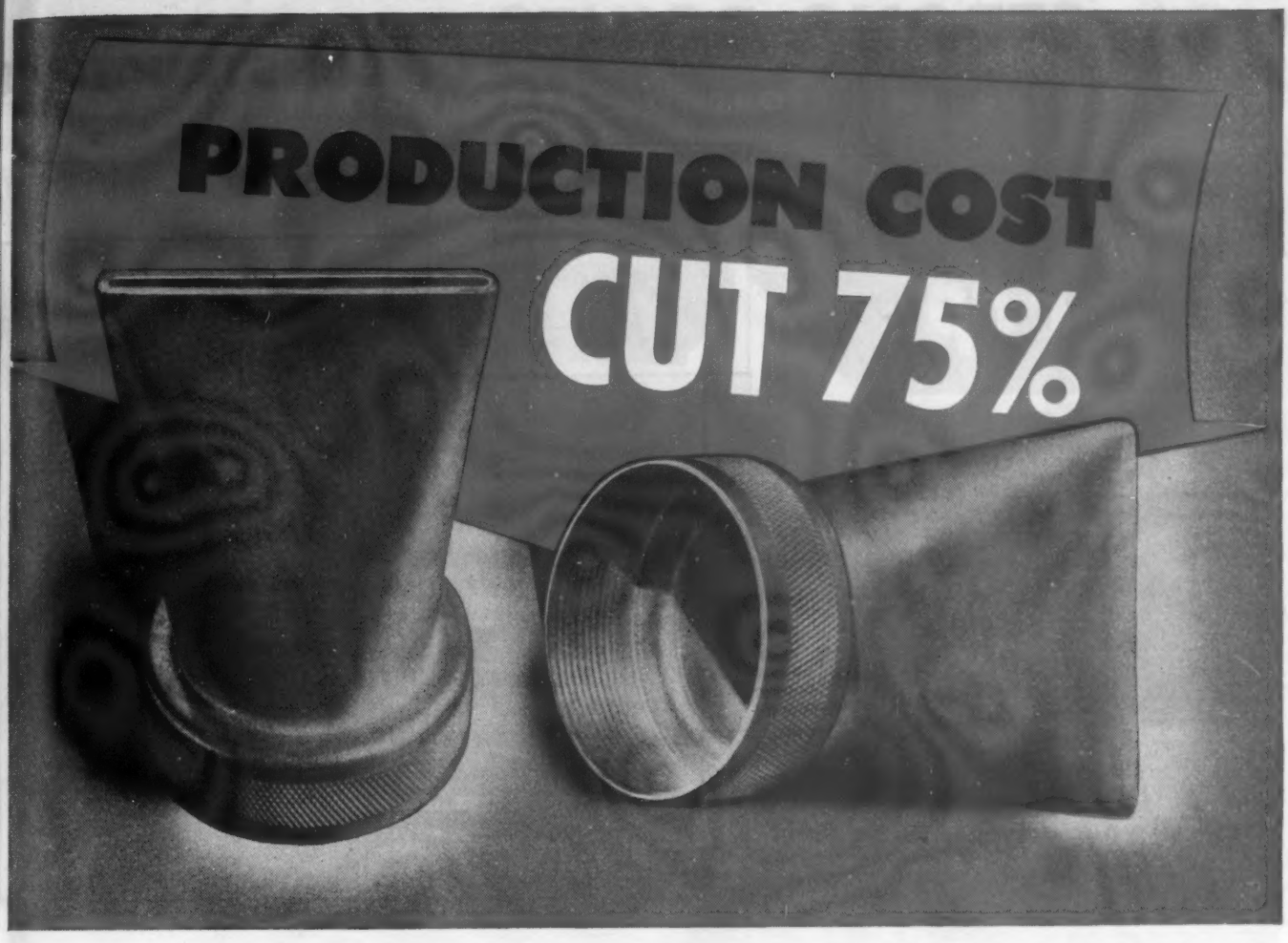
Operation: Braze steel disc and nut inside cup
Alloy: Silver Solder Grade 4
Flux: Fluoride
Temp. Limit: Flow Solder
Lepel Unit: 30 K.W. Input
Approx. Temperature: 1250° F
Heating Time: One piece, 16 sec.
6 pieces simultaneously, 92 sec.

VISIT THE LEPEL EXHIBIT
Booths K615, K617, National Metal Congress and Exposition, Public Hall, Cleveland, Feb. 4-8, 1946.

Lepel High Frequency INDUCTION HEATING UNITS

LEPEL HIGH FREQUENCY LABORATORIES, INC.
PIONEERS IN INDUCTION HEATING
***General Offices:* 39 West 60th Street, New York 23, N. Y.**

DO IT FASTER, BETTER, MORE ECONOMICALLY BY LEPEL INDUCTION HEATING



...with *Republic* ELECTRUNITE *Tubing*

Formerly, the caulking gun nozzle shown above was produced by flattening one end of a short piece of tubing and brazing the opposite end to a threaded collar.

Now, with Republic ELECTRUNITE Tubing, brazing has been eliminated. The complete nozzle is formed from one length of 1¾" O.D. x 16 gauge tubing in two press operations. These consist of forming the knurled shoulder end by expanding the tubing from 1¾" O.D. to 2¼" O.D. and flattening the nozzle end over a die. The knurled shoulder is then threaded and the part is ready for plating.

Cost savings resulting from the change in production methods are estimated at 75% by the manufacturer.

Perhaps you, too, have an application in which the use of highly ductile and easy-to-fabricate ELECTRUNITE Tubing can cut production cost or improve product quality. Remember that this *modern* tubing's consistent uniformity in diameter, wall thickness, concentricity and hardness assures perfectly-formed finished tubular parts—with fine scale-free surfaces for the application of smooth coatings of plating, paint or plastic.

ELECTRUNITE engineers are always ready to help you get the most out of tubing. For more information write to:

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

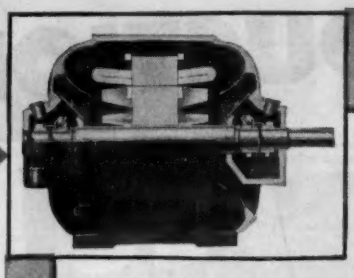
Republic
ELECTRUNITE
Reg. U. S. Pat. Off
TUBING

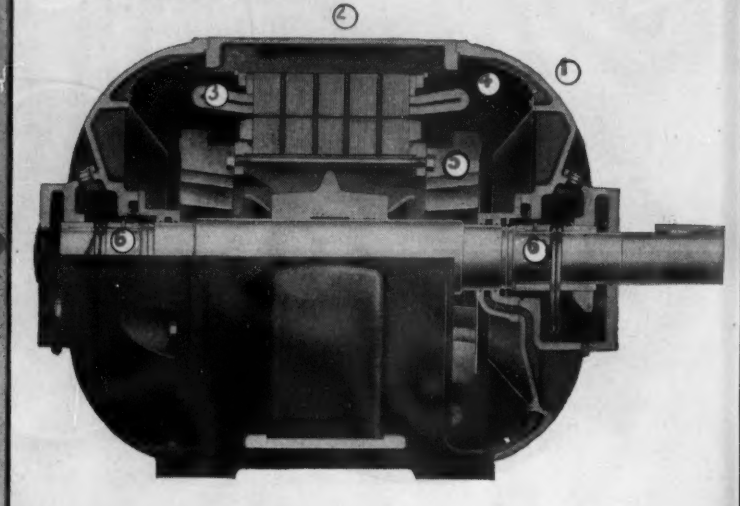
Mechanical, Aircraft, Stainless Steel and Rail Steel Tubing—Boiler, Condenser and Heat Exchanger Tubes

SAME STRONG POINTS OF CONSTRUCTION

from 1 hp

to 2000 hp





Now all your drives—large and small—can have standard G-E Tri-Clad induction motors with the famous protective features that guard against PHYSICAL DAMAGE, ELECTRICAL BREAKDOWN, OPERATING WEAR AND TEAR.

Tri-Clad, in its wide range of types and sizes (recently increased to 2000 hp), is G.E.'s most widely used (integral-hp) motor. For complete details on ratings, characteristics, and dimensions, write for Bulletin GEA-3580. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

HERE'S TODAY'S WIDER RANGE OF STANDARD SIZES	
Tri-Clad Type K (Low starting current, normal starting torque)	1 hp to 2000 hp at 1800 rpm
Tri-Clad Type KG (High starting torque, low starting current)	5 hp to 200 hp at 1800 rpm
Tri-Clad Type KR (High starting torque, high slip)	Available to 100 hp in speeds required for high-slip flywheel drive (punch press, etc.)

1. Cast-iron frame and rigid, cast-iron end shields protect the motor from external blows and accidental abuse.

2. Completely enclosed upper portion of frame guards against entry of falling objects and dripping liquids; keeps chips and the like from vital motor parts.

3. Windings of Formex* wire—one of the toughest magnet wires yet developed—resist heat aging, heat shock, and abrasion.

4. End windings are coated with Glyptal* varnish, providing a tough, hard finish that withstands moisture, oil, and abrasion.

5. Low-velocity, double-end ventilating system keeps the motor running cool and prolongs insulation life. One-piece, cast-aluminum rotor (used on all but the largest sizes), with integrally cast fans, is practically indestructible.

6. Bearings have extra capacity to take heavy shaft loadings from any direction. Lubrication is convenient, its effectiveness well proved.

*Trade-mark reg. U. S. Pat. Off.

TRI CLAD MOTORS

Buy all the BONDS you can — and keep all you buy

250-2W-8030

GENERAL ELECTRIC

Eastern Airlines Silverliner by Curtiss

YESTERDAY she was ferrying tons of vital war materials over the Hump; flying stout-hearted Paratroopers into battle; hurrying wounded American boys home to peaceful safety. Known to the Army as the C-46, she was more affectionately dubbed the "flying boxcar".

Today, this tried and proved Curtiss Commando is ready for service over the important air lanes of Eastern Airlines . . . luxuriously refitted to carry 36 passengers in deep-cushioned, air-conditioned comfort. New ideas of safety and speed make her one of the world's largest, fastest and smoothest flying twin-engined transports.

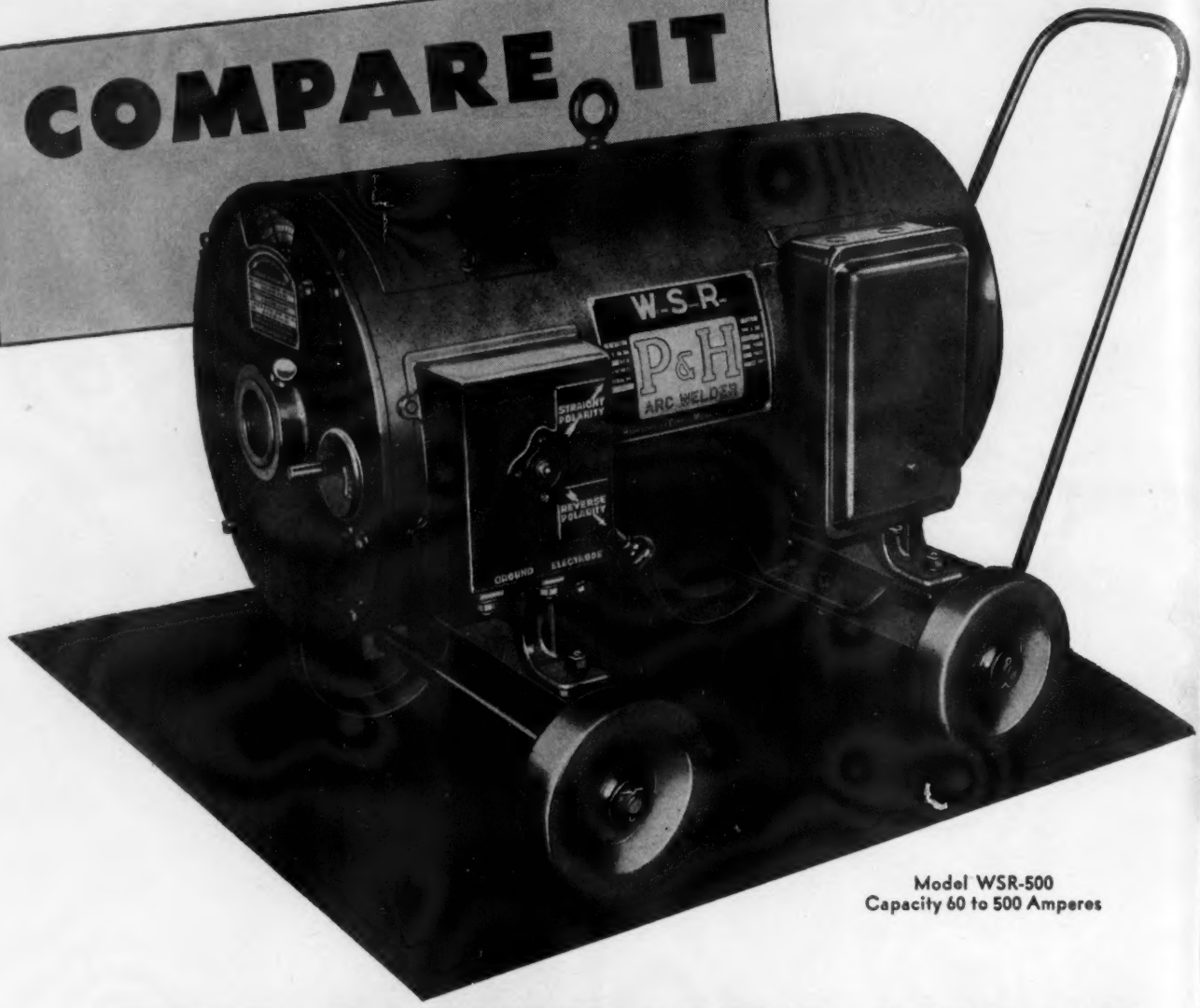
These luxury planes have been made possible by the many new aircraft products that were born in the white-hot crucible of war. Many of these products were designed and built by PESCO. And now, in peace, PESCO know-how makes these precision-built hydraulic and liquid pumps and controls available to commercial aviation and other industries. For descriptive literature regarding Pressurized Power and Liquid Flow equipment, write PESCO Products Co., (division Borg-Warner), 11610 Euclid Avenue, Cleveland 6, Ohio.

In Precision Hydraulics, Fuel Pumps, Air Pumps, Related Accessories . . .

PESCO BORG-WARNER

PERFORMANCE POINTS TO Pesco FIRST

COMPARE IT



Model WSR-500
Capacity 60 to 500 Amperes

. . . FOR DOWNRIGHT VALUE!

No matter how you look at this P&H WSR-500 Welder—it spells *value!* Value from its more liberal use of copper . . . its ample capacity . . . its ability to handle larger electrodes to cut the cost of depositing weld metal.

- SINGLE HEAT CONTROL — one simple adjustment for any desired welding current. The operator can't be confused. Arc response is automatic on all types of work — with all classes of electrodes.
- SIMPLIFIED DESIGN—only *two* major parts, a rigid one-piece frame and husky rotating member.
- WSR (WELDING SERVICE RANGE) RATING—certifying the exact usable welding current of each machine from minimum to maximum capacity. You know your cost per ampere.
- VISI-MATIC CALIBRATION—enables you to select instantly the correct current for each of the three classes of electrodes.

Write *today* for information on the Model WSR-500. P&H also manufactures a complete line of welding electrodes for all production and maintenance welding.

General Offices: 4411 W. National Ave., Milwaukee 14, Wis.

A COMPLETE ARC WELDING SERVICE

DC Welders | AC Welders | Welding Electrodes | Welding Positioners | Welding Control Systems | Electric Hoists

P&H ARC WELDERS

HARNISCHFEGER CORPORATION

WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

"Yes sir! We have steel ready for your reconversion needs —*call us*"

UNITED STATES STEEL SUPPLY COMPANY

USS

STEELS

SERVICE

Our present stocks include all standard grades and sizes of U·S·S Stainless Steels, and a complete line of Carbon Steel Products. These stocks are being increased as rapidly as circumstances permit. Our aim is to have the widest possible variety of materials on hand to help you speed reconversion efficiently and resume peacetime production quickly.

When you need steel, steel products, tools, equipment or machinery get in touch with the nearest of our nine warehouses. They are located in key manufacturing areas, and deliveries can be made quickly to any point. If it should happen that an order cannot be filled by one warehouse, it usually can be shipped promptly from another.

Every order and inquiry, whether for a pound or a carload, receives courteous attention and prompt action.

UNITED STATES STEEL SUPPLY COMPANY

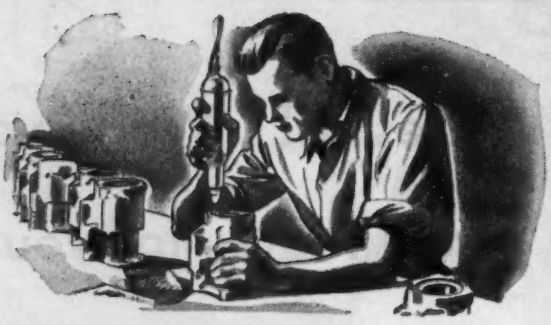
CHICAGO (90)	1319 Wabansia Ave., P. O. Box MM—BRUnswick 2000
BALTIMORE (3)	Bush & Wicomico Sts., P. O. Box 2036—GILmore 3100
BOSTON	176 Lincoln St., (Allston 34), P. O. Box 42—STAdium 9400
CLEVELAND (14)	1394 E. 39th St. HEnderson 5750
MILWAUKEE (1)	4027 West Scott St., P. O. Box 2045—MItchell 7500
NEWARK (1), N. J.	Foot of Bessemer St., P. O. Box 479—BIgelow 3-5920 REctor 2-6560, BErgen 3-1614
PITTSBURGH (12)	1281 Reedsdale St., N. S. CEdar 7780
ST. LOUIS (3)	21st & Gratiot Sts., P. O. Box 27 MAin 5235
TWIN CITY	2545 University Ave., St. Paul (4), Minn. NEstor 2821

EVERY SUNDAY EVENING, United States Steel presents *The Theatre Guild on the Air.* American Broadcasting Company coast-to-coast network. Consult your newspaper for time and station.

UNITED STATES STEEL

IT'S A PRODUCTION PLUSSER!

Time was when this manufacturer of magneto housings used slotted screws *and* helical inserts to fasten heads to withstand flight vibrations. Though expensive, this laborious, 2-step hand operation never produced completely vibrationless fastenings.



IT'S A COST REDUCER!

By switching to Phillips Recessed Head Screws, this manufacturer turned a slow-motion process into a fast, 1-step power operation, got a truly vibration-proof fastening. He also sliced fastening material costs about 71%, assembly costs correspondingly!

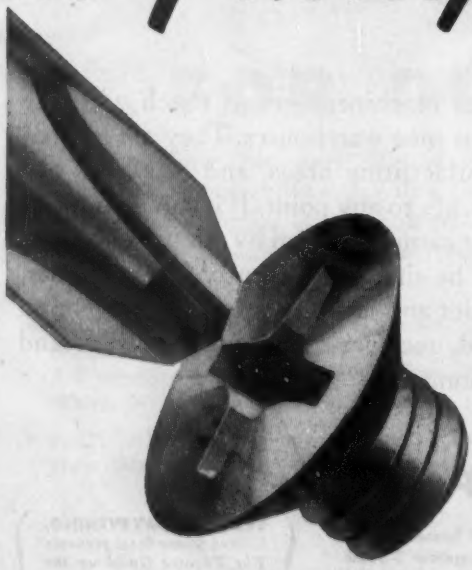
IT'S A STRENGTH BUILDER!

Besides being more efficient from assembly and cost angles, Phillips Screws are better from the design angle. Engineered to stand heaviest driving pressures, they take *any* load you need to impart product strength and rigidity.

IT'S AN ORDER GETTER!

From the sales angle, too, Phillips Screws are in a class by themselves. They snap up appearance of any product . . . make it stronger . . . and banish the burred screw heads that mar smooth surfaces, snag clothing, sabotage sales.

It's Phillips — the engineered recess!



In the Phillips Recess, mechanical principles are so correctly applied that every angle, plane, and dimension contributes fully to screw-driving efficiency.

. . . It's the exact pitch of the angles that eliminates driver skids.

. . . It's the engineered design of the 16 planes that makes it easy to apply full turning power – without reaming.

. . . It's the "just-right" depth of recess that enables Phillips Screw Heads to take heaviest driving pressures.

With such precise engineering, is it any wonder that Phillips Screws speed driving as much as 50% – cut costs correspondingly?

To give workers a chance to do their best, give them faster, easier-driving Phillips Recessed Head Screws. Plan Phillips Screws into your product now.

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

Made in all sizes, types and head styles

25 SOURCES

American Screw Co., Providence, R. I.
Atlantic Screw Works, Hartford, Conn.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N.Y.
Scovill Manufacturing Co., Waterville, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
The Steel Company of Canada Ltd., Hamilton, Canada
Wolverine Bolt Co., Detroit, Mich.

Products Manufactured by UNITED

Rolling Mills

Blooming · Slabbing · Plate · Universal 2, 3, 4-high 4-high Hot Strip · Bar · Rail and Structural · Merchant Rod · Sheet · Skelp · Pipe and Tube · 2 and 4-high Cold Strip · Tin · Uni-Temper.
In all types: Single Stand, One Way or Reversing, Tandem, Continuous, etc. For Carbon Steel, Alloy Steels, Copper, Brass, Aluminum and other Non-Ferrous Metals.

Rolls

"UNEFCO" Green Wabblers Grain and Chill · United Nickel Chill · United Moly. Chill · United Spec. Process UX Chill and Grain · H.D. Spec. Process · Lincoln Special · United Unidense · United Special Steel · United Carbon Steel · United Adamite · United VAN-X · United Super X · United Straight Chill.

Auxiliary Equipment

Ingot Cars
Manipulators
Edgers
Mill Tables
Transfers
Hot Beds
Structural Straighteners
Bloom Shears
Vertical Shears
Hot and Cold Saws
Rod Reels
Hot Strip Reels
Flying Shears
Shearing Lines
Slitting and Trimming Lines
UNIDRAW—Continuous Draw Benches
Steam Hydraulic Forging Presses
Electro-Hydraulic Forging Presses
Electro-Hydraulic Piercing Presses
Hydraulic Presses
Universal Couplings
Welding Manipulators
Plate and Squaring Shears
Precision Levellers
Cone Type Uncoilers
Coil Boxes
Upcoilers & Downcoilers (Strip)
Cold Strip Reels
Cone Worm Drives
Gear Reduction Units
Generated Gears and Pinions
Continuous Strip Picklers
Semi-Continuous Strip Picklers
Rotary Strip Picklers
Electrolytic Strip Cleaning Lines
Electrolytic Strip Tinning and Coating Lines
United Mill Lubricating Systems
Material Handling Equipment
Portable Crop Shears
Lever Shears
Roll Lathes
Pressuremeters
Heavy Weldments
Annealing Boxes
Steel Castings

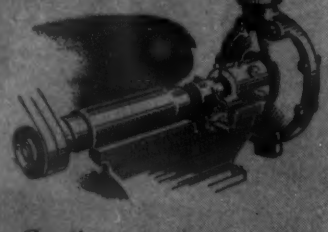
UNEFCO REG. T.M.

The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment

UNITED ENGINEERING AND FOUNDRY COMPANY
PITTSBURGH, PENNSYLVANIA
Plants at Pittsburgh • Vandergrift • New Castle • Youngstown • Canton
Subsidiary: Adamson United Company, Akron, Ohio
Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works, Ltd., Montreal, P. Q. Canada

For the Tough Jobs use H

Properties of HAYNES STELLITE Alloys	Average Tensile Strength, psi	Average Hardness, Rockwell	Melting Point, Deg. F	Can be Forged	Can be Rolled	Oxida at H Tem
HAYNES STELLITE Cobalt-Base Alloys						
1	47,000	C54	2,282	No	No	Excel
6 Cast	105,000	C40	2,327	Yes	Yes	Excel
Rolled	130,000	C40 to C46				
12	76,000	C48	2,306	No	No	Excel
Star J-Metal	65,000	C61	2,318	No	No	Excel
98M2	63,000	C62	2,250	No	No	Excel
HASTELLOY Nickel-Base Alloys						
B Cast	80,000	B96	2,440	Yes	Yes	Fa
Rolled	135,000	B98				
C Cast	76,000	B93	2,350	No	Yes	Excel
Rolled	120,000	B90				
D Cast	38,000	C53	2,040	No	No	Fa
HAYSTELLITE Tungsten-Base Alloys	—	Between 9 and 10 Moh's Scale	—	No	No	—
HASCROME Iron-Base Rod	40,000	C40-50 after peening	—	Yes	Yes	Fa



Castings . . . A wide range of castings can be supplied in:
HAYNES STELLITE Alloys 6, Star J-Metal, 98M2, 93
HASTELLOY Alloys B, C, D
HAYSTELLITE Tungsten-Base Alloys

Rolled Forms . . . Sheets and plates are made from:
HAYNES STELLITE Alloy 6
HASTELLOY Alloys B, C
Hot-rolled bars are supplied in:
HASTELLOY Alloy B

Welding Rods . . . for applying a wear- and corrosion-resistant alloy coating to other metals:
HAYNES STELLITE Alloys 1, 6, 12
HASTELLOY Alloys B, C, D
HAYSTELLITE Alloys
HASCROME Rod

HAYNES STELLITE Alloys

	Resistance to Corrosion		
	Oxidation at High Temp.	Sulphuric Acid	Hydrochloric Acid
	Excellent	Fair	Fair
	Excellent	Fair	Fair
	Excellent	Fair	Fair
	Excellent	Fair	Fair
	Excellent	Fair	Fair
	Fair	Good	Excellent
	Excellent	Good	Good
	Fair	Excellent	Fair
	—	—	—
	Fair	—	—

Available in a wide range of properties and forms to resist wear, corrosion, and heat . . .

HAYNES STELLITE alloys are specially made to meet the requirements of industry's most difficult applications. They are hard, tough, and heat-resistant and are used for those parts of equipment and machines that are most subject to wear and corrosion. The chart at the left describes some of these alloys and their significant properties. Sketched below are some of the forms in which they can be furnished.

For further information, write for the booklet, "Properties of HAYNES STELLITE Alloys."

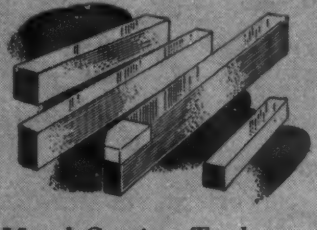
HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

General Office and Works, Kokomo, Ind.

Chicago—Cleveland—Detroit—Houston—Los Angeles—New York—San Francisco—Tulsa



Metal-Cutting Tools . . . made from HAYNES STELLITE Alloys, known for their red hardness. These tools take heavy cuts at high speeds and coarse feeds—with long life between grinds:

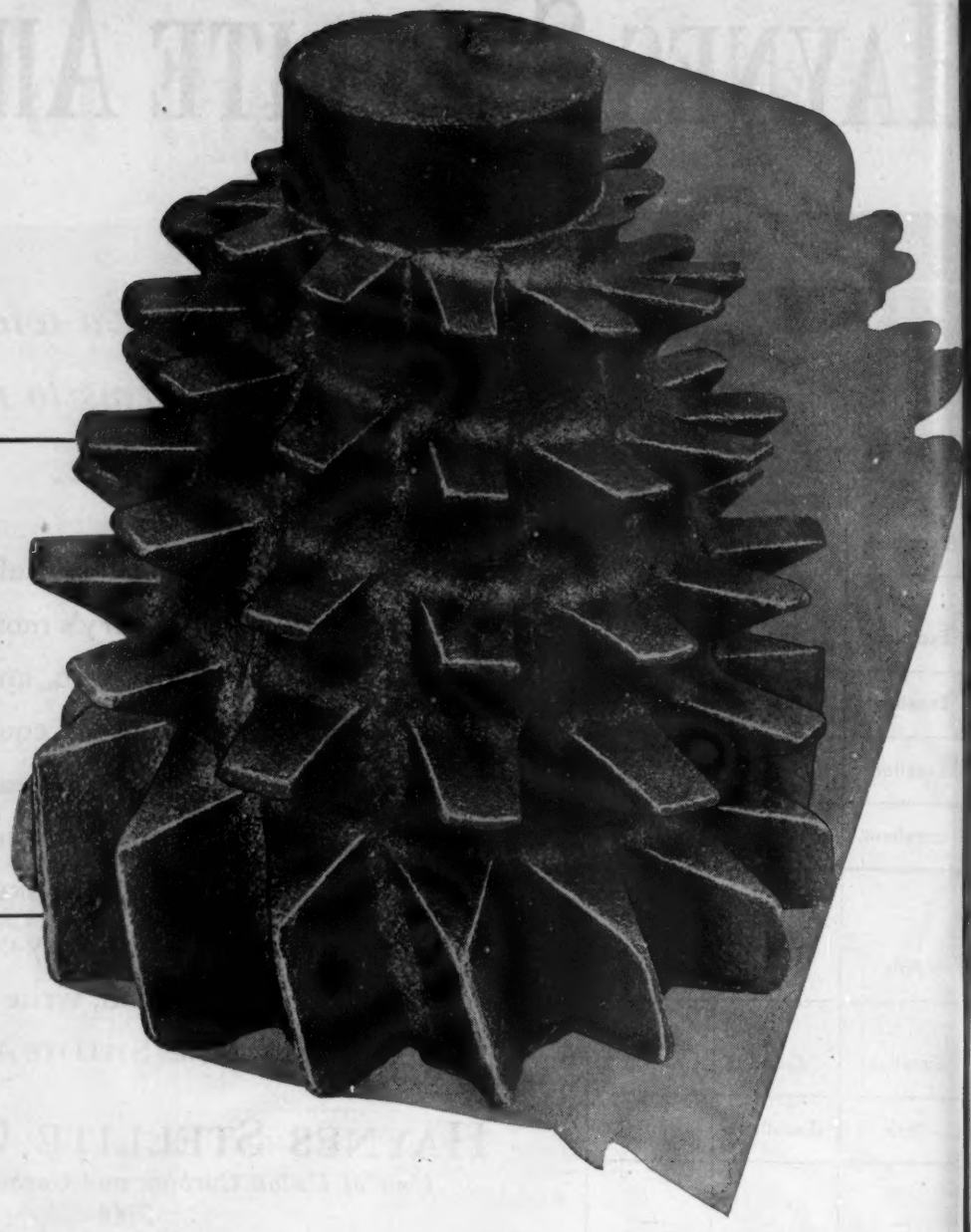
HAYNES STELLITE Star J-Metal
HAYNES STELLITE Alloy 98M2

HAYNES STELLITE TRADE-MARK

HAYNES STELLITE . . . HASTELLOY . . . HAYSTELLITE . . . HASCROME are registered trade-marks of Haynes Stellite Company.

BUY AND HOLD UNITED STATES VICTORY BONDS AND STAMPS

Pineapple with Teeth...



This steel "pineapple" is the business end of a drill bit for sinking oil wells. It's a rock cutter—has to be tough, strong and hard.

These cutters used to be machined from bar stock, a long and difficult process. Now they are cast, with a positive saving of six hours in machine time—a cost reduction of TWO THIRDS.

But maybe you don't make drill bits for oil wells!

So we suggest that you consider this as an example of how steel castings might help you to turn out improved products at lower cost of production.

That's certain to be an important subject for the manufacturer who will be called upon to meet stiff competition.

Remember that steel castings can give you whatever properties you need, in any combination of those properties, along with the lowest possible cost of production.

Why not talk it over with your steel foundry? Or write to Steel Founders' Society, 920 Midland Building, Cleveland, Ohio.

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

friction insurance

for your 1946 Production

DURING almost half a century, BCA Ball Bearings have been reducing friction... providing smooth, dependable machine performance... for leading manufacturers. Now, once more, these bearings are available on a normal delivery basis.

Equipment makers and equipment users have both found that they reduce equipment maintenance when they specify BCA. They have learned that BCA Ball Bearings are engineered to provide an ample margin of safety for specified shocks, loads and thrusts. That's why you will benefit by discussing your needs with BCA—whether you need radial, thrust or angular contact ball bearings.

BEARINGS COMPANY OF AMERICA
LANCASTER, PENNA.

BCA

RADIAL • ANGULAR CONTACT • THRUST

BALL BEARINGS

A Built-In Feature of Every Fairbanks-Morse Scale

Every possible step is taken to assure users maximum life from Fairbanks-Morse Scales.

Only the finest materials and skilled craftsmanship are employed. Down to the most minute part, precision is a jealously-guarded tradition.

These high standards, plus sound engineering and modern production and inspection facilities, combine to produce weighing machines of unsurpassed accuracy and endurance.

That's why you'll find Fairbanks-Morse Scales an accepted standard of reliability throughout the business world. Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

FAIRBANKS MORSE

Fairbanks-Morse

A name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • GENERATORS • MOTORS • PUMPS • SCALES
MAGNETOS • STOKERS • RAILROAD MOTOR CARS AND STANDPIPES • FARM EQUIPMENT

EDITORIAL STAFF

E. L. Shaner
Editor-in-Chief

E. C. Kreutzberg
Editor

M. M. Rooney
News Editor

Irwin H. Such
Engineering Editor

J. D. Knox
Steel Plant Editor

Guy Hubbard
Machine Tool Editor

Don S. Cadot
Art Editor

ASSOCIATE EDITORS

G. H. Manlove, W. J. Campbell, W. W. Birdsall, F. R. Briggs, D. B. Wilkin, Vance Bell

New York: B. K. Price, L. E. Browne
Pittsburgh: J. C. Sullivan
Chicago: E. F. Ross
Detroit: A. H. Allen
Washington: L. M. Lamm
London: Vincent Delport

ASSISTANT EDITORS

A. J. Fingulin, Dolores K. Blaha, Lucille Bell, Virginia B. Harms
John Parina Jr.

EDITORIAL CORRESPONDENTS

R. W. Kincey
Birmingham, Ala.

L. C. Feldmann
Buffalo, N. Y.

George R. Reiss
Youngstown, O.

Samuel S. Carr
Cincinnati, O.

Mac Hutchens
St. Louis, Mo.

F. S. Tobin
Toronto, Ont.

Maurice Beam
4453 Bel Aire Drive, La Canada,
Los Angeles, Calif

Robert Bottorff
415 Bush St., San Francisco, Calif.

R. C. Hill
408 Marion St., Seattle, Wash.

BUSINESS STAFF

G. O. Hays
Business Manager

R. C. Jaenke
Advertising Manager

C. H. Bailey
Advertising Service

New York, E. W. Kreutzberg, K. A. Zollner
Pittsburgh, S. H. Jasper, B. C. Snell
Chicago, L. C. Pelott, V. W. Volk
Cleveland, D. C. Kiefer, H. C. Rowland
Los Angeles, F. J. Fuller

RESEARCH and PROMOTION

J. W. Zuber, *Manager*
R. L. Hartford, *Assistant Manager*
Helen Metzner, *Circulation*

PRODUCTION DEPARTMENT

A. V. Anderson, *Manager*

MAIN OFFICE

Penton Building, Cleveland 13, Ohio

BRANCH OFFICES

New York 17 ..... 16 East 43rd St.
Chicago 11 ..... 520 North Michigan Ave.
Pittsburgh 19 ..... 2800 Koppers Bldg.
Detroit 2 ..... 6560 Cass Ave.
Washington 4 ..... 956 National Press Bldg.
Los Angeles 4 ..... 130 N. New Hampshire Ave.
London ..... 2 Caxton St., Westminster, S.W. 1

• • •

Published by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio, E. L. Shaner, President and Treasurer; G. O. Hays, Vice President and General Manager; R. C. Jaenke, Vice President; F. G. Steinebach, Vice President and Secretary; E. L. Werner, Assistant Treasurer.

Member, Audit Bureau of Circulations; Associated Business Papers Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $6; two years $10; all other countries, one year $12. Single copies (current issues) 25c. Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879. Copyright 1945 by the Penton Publishing Co.

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 117, NO. 24 DEC. 10, 1945

NEWS

Hope for Industrial Peace Rises 83
Automobile Workers Hostile to Fact-Finding, Cool-Off Program 85
Seeks Aid for Small, Nonintegrated Steel Producers 86
Price Relief Appeals Allowed if Wages Have Risen 33% Over 1941 87
Reconversion Difficulties Probed by Industrialists at NAM Meeting 88
Promising Future Predicted for Electric Furnace Steel Industry 89
Warehouse Problems Discussed at Meeting of Industry Group 90
Justice Department Program in Aluminum Held Employment Check 91
Kaiser Pays Off Government Loan on Permanente Magnesium Plant 96
California's List of Unemployed Up Only 80,000 Since War's End 97
Mahoning Valley Strives To Hold Its Steelmaking Position 102
Termination of War Contracts Being Speeded 105

TECHNICAL

Contour Forming Produces Complex Shapes of Aluminum or Steel 111
Wide functional latitudes incorporated in modern bending machines
Drawing Stainless Steel Cylinders in Two Diameters 113
Ingenious production set-up substitutes sheet for tubing
Strip Templets for Flame Cutting Difficult Shapes 118
Swinging template section aids in alignment and speeds work
Twin Production Lines Incorporate Materials Handling Innovations 121
Special tooling for rocket manufacturing also achieves remarkable output
Principles of Iron Ore Beneficiation—Part III 122
Effects on blast furnace operation described in comprehensive review
Powdered Metal Welding Rods Made by New Process 130
Metal powders compacted around iron wire core for alloy rods
Combustion Control Reduces Fuel Costs 134
Uniformity of product assured, furnace repairs reduced to minimum
Preventing Tool Galling by Nitriding 142
Three treatments cover wide range of steel grades and tool services

FEATURES

As the Editor Views the News .. 79
Present, Past and Pending 87
Transition Topics 91
Windows of Washington 92
Mirrors of Motordom 99
Men of Industry 106
Obituaries 110
Industrial Equipment 146
The Business Trend 188
Construction and Enterprise ... 212

MARKETS

Steel Users Shift to Less Heavily Loaded Products 193
Market Prices and Composites 194

Index to advertisers 224

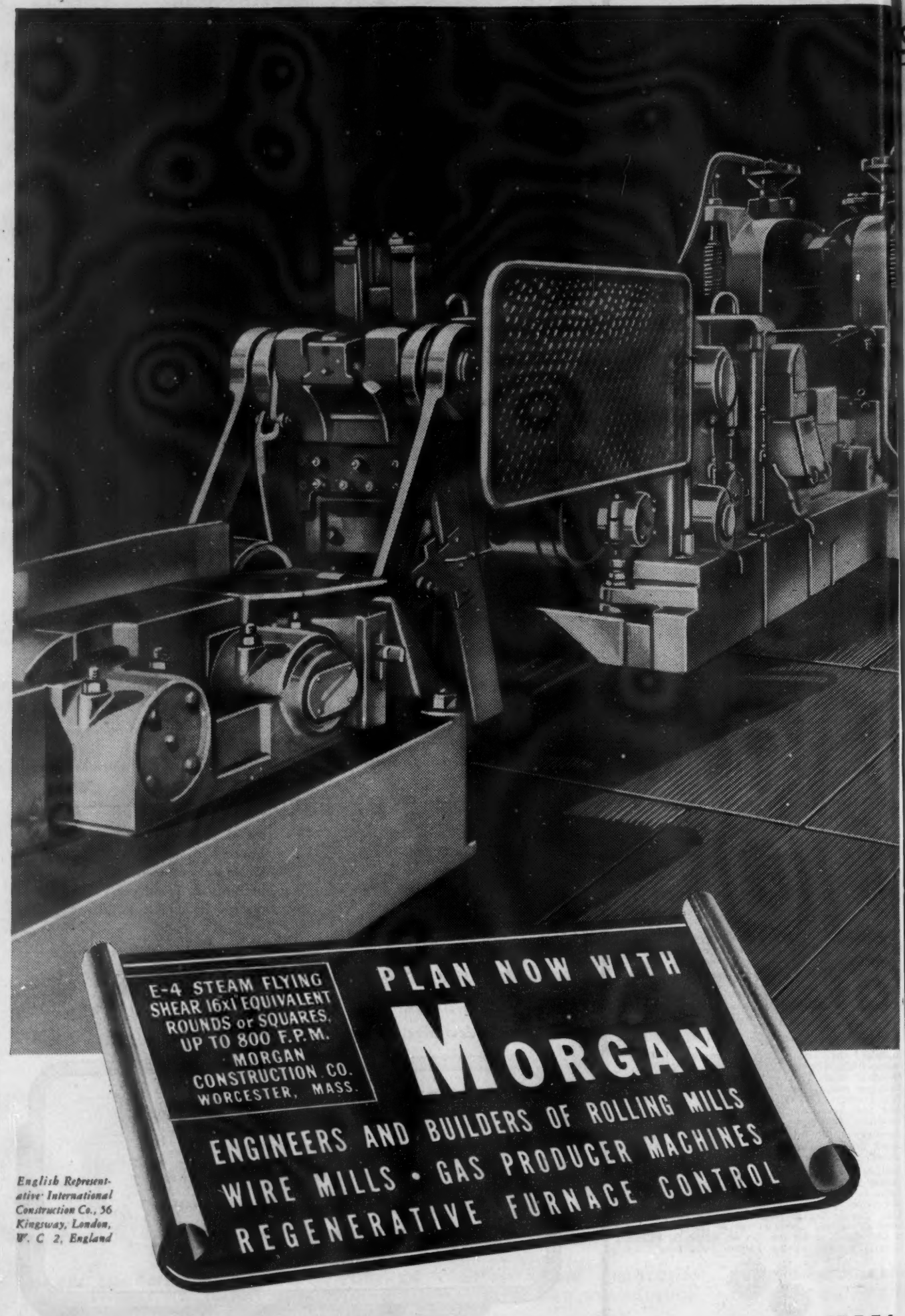
NEXT WEEK...

Steel Packaging Exceeds Service Expectations

Brittle Lacquer for Use in Determining Stresses

Machinability of Sulphite Treated Alloy Steels

Special Fixtures for Handling Long Loads


E-4 STEAM FLYING SHEAR 16x1 EQUIVALENT ROUNDS or SQUARES, UP TO 800 F.P.M. MORGAN CONSTRUCTION CO. WORCESTER, MASS.
PLAN NOW WITH
MORGAN
ENGINEERS AND BUILDERS OF ROLLING MILLS
WIRE MILLS • GAS PRODUCER MACHINES
REGENERATIVE FURNACE CONTROL

English Representative: International Construction Co., 56 Kingsway, London, W. C 2, England

STEEL
December 10, 1945

Eleventh-Hour Chance!

As this is being written, there appears to be a slender chance—an outside chance—that UAW-CIO and General Motors may settle their dispute soon.

If this happy event comes to pass, part of the credit must go to President Truman for his consistent adherence to one fundamental point. Throughout this labor mess and in spite of a lot of bungling all along the line, the President has stood firm on one premise. He has insisted that now that the war is over, the government should retire from its position as arbiter and supervisor of labor disputes and permit employers and unions to settle their differences without government interference.

He made this point crystal clear in his opening address to the late lamented management-labor conference. He urged the delegates to propose procedures for settling labor disputes that would enable the federal government to step out of the picture. The conference failed to do this. Its sole accomplishment, beyond the good will and understanding accruing from four weeks of discussion, was agreement on a number of general platitudes.

Industry and labor having failed to take advantage of the scoring opportunity offered by the conference, the ball automatically went back to the President. In his address of Dec. 3, he threw a forward pass to Congress. He asked the lawmakers for "well reasoned and workable legislation that will provide adequate means for settling industrial disputes." He suggested procedures similar to those provided in the Railway Labor Act—procedures that would involve extensive fact finding and a cooling-off period.

Employers and union leaders require no great powers of imagination to realize that fact-finding under public auspices would be embarrassing and annoying. Fact-finding would puncture Reuther's balloon of hysterical charges and false innuendoes. Likewise it would subject employers to a detailed examination of their books, a certain opening wedge to a consideration of prices and profits as factors pertinent to wage rates. Apparently UAW-CIO and GM recognize these complications; they have resumed independent negotiations with renewed vigor.

One thing is certain. If current disputes are not resolved satisfactorily soon, Congress will be forced to pass strike-curbing legislation. Such laws, if passed, probably would be more drastic than the measures proposed by President Truman. They would hurt employers as much as unions.

An eleventh-hour chance of heading off government intervention in labor disputes in peacetime remains. Industry and union officials should make the most of it.

PRICE FOOLISHNESS: Representatives of OPA will meet this week with steel company executives to discuss the plight of non-integrated mills that are caught between rising costs and price ceilings.

These conferences have been overdue for months because the smaller companies are in a serious predicament. They are confronted with a double threat. One is that rising costs are pressing against the ceiling of prices they are permitted to charge for their rolled products. The other is that a similar cost-price squeeze is causing integrated mills to produce semifinished steel at a loss, which fact practically forces the integrated producers to use their semi-finished steel in their own finishing mills rather than to sell it to non-integrated customers. As a result, the smaller companies find it difficult to obtain semi-finished steel from any source.

Similar situations are common throughout the metalworking industries. Thousands of manufacturers cannot buy from their former suppliers because of the cost-price squeeze. They are forced to

(OVER)

turn to new suppliers who, not having made the part or material before, are not bound by profitless OPA ceilings.

This situation is causing producers to forego the kind of business they are best qualified to perform and to seek survival in new, fringe lines. Price administration that makes this necessary is ridiculous.
—p. 86

• • •

VERSATILE MACHINES: Decades ago whenever a job came into the shop involving a forming operation on flat rolled steel that could not be handled on a bending roll or brake, the master blacksmith or boilermaker was called in. He would rig up a heating device, improvise a few dies and with the help of a steam hammer or of a husky helper swinging a sledge would hammer out a few pieces in reasonable conformity to the shape desired.

Evolution in forming since that time has been fascinating. Bulldozers, brakes, rolls and presses of many descriptions have been developed. We now have equipment that can press out an intricate part at a single, powerful stroke.

This is ideal for mass production, but there is need for more versatile equipment. This need is being fulfilled in part by contour forming machines. Designated as stretch formers, compression formers and tangent benders, they may figure prominently in postwar manufacturing technique. —p. 112

• • •

EFFICIENCY A CRIME? Recently Attorney General Clark urged Congress to break up the Aluminum Co. of America for the reason that the company is so efficient that it would be easier to dissolve it into regional units than to find another company willing to spend the time and money necessary to create a well-integrated, low-cost competitor.

Arthur V. Davis, chairman of Aluminum, has replied to the attorney general, pointing out that the federal courts have ruled that Alcoa has no monopoly in raw materials or in fabricated products, leaving the issue of monopoly open only in the field of aluminum smelting.

This case is interesting to all industry. If the Department of Justice can break up Alcoa because it is too efficient in aluminum, it can break up other corporations because they are too efficient in steel, electric motors, refrigerators or automobiles.

There may be good reasons for curbing bigness in industry, but being too efficient is not one of them.
—p. 91

POSTWAR POSTSCRIPTS: Will current trends in steel pricing, stemming from government pressure to place steel producers on a f.o.b. mill basis, cause automobile, refrigerator and other mass production manufacturers to locate their plants in closer proximity to the sources of steel supply? This contingency (p. 100) seems to be under discussion in motordom. . . . Henry J. Kaiser announces that his steelworks at Fontana (p. 96) has been awarded a contract for 55,000 tons of semifinished steel by the French government. . . . Secretary of Commerce Henry A. Wallace, speaking at the Golden Anniversary of the National Association of Manufacturers (p. 88), stressed these three points: (1) We can't spend our way into prosperity just by dipping freely into the federal treasury; (2) satisfactory profits for stable enterprises and higher rewards for venture capital are essential and (3) increased output per worker is essential to a steady rise in real wages. How odd it is that these sound truisms are almost diametrically opposed to Mr. Wallace's views on the same subjects expressed in 1944 when he was touring the nation in a campaign of denunciation against American industry. . . . Bethlehem Steel, through its recent organized Bethlehem Pacific Coast Steel Corp. (p. 97), will double its capacity in the Los Angeles area. . . . Among the most amazing about-faces on record is the attitude of President Thomas of UAW in regard to General Motors' proposal that certain GM parts divisions resume operations for the benefit of other automobile manufacturers. Mr. Thomas wrote a letter (p. 99) saying the offer came as "a welcome surprise" and that he would "of course accept it." When other union officials heard of this partial back-to-work commitment, they hit the ceiling. Thomas disavowed the letter and wired the attorney general asking for an investigation of an alleged GM monopoly in fuel pumps. It has been known that a union signature on a collective bargaining contract ofttimes is worthless, but it comes as something of a shock that a union signature on a letter also can be meaningless. . . . Within 16 miles of Youngstown's Central Square is the fourth largest steel producing district of the nation, known as the "Ruhr of America." Hopes run high that the proposed Lake Erie-Ohio River waterway (p. 102) will give the district lower transportation costs—an advantage that would help tremendously in maintaining Youngstown's competitive position in postwar markets.

E. L. Shaner

EDITOR-IN-CHIEF

STREAMLINING THE "SWING-BACK"

In these days of transition many manufacturers are going into the production of radically new products, becoming familiar with new equipment, adapting old machines to new uses and finding out how to control processes that are different. They are in the throes of a "swing-back" from wartime operation to peacetime manufacturing.

Inland metallurgists are familiar figures in many of these plants, where for years they have been applying their expert knowledge of putting steel to work for others.

Today, Inland metallurgists are continuing that valuable work. Their technical and practical experience in the selection of steel, in latest fabrication methods, and in speeding up output, are helping manufacturers produce many kinds of newer and better products.

If you have a problem in the use of steel, call on us. A member of our metallurgical staff will be glad to call and work closely with you.

Inland Steel Company, 38 S. Dearborn St., Chicago 3, Ill. Sales Offices: Cincinnati, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul. Principal Products: Bars • Structurals • Plates Sheets • Strip • Tin Plate • Floor Plate Piling • Reinforcing Bars • Rails • Track Accessories

INLAND STEEL

FASTER, FINER MACHINING

at lower cost when cutting fluids . . .

- ★ Lubricate and cool the tools
- ★ Prevent chip welding
- ★ Permit higher cutting speeds
- ★ Prolong tool life
- ★ Improve surface finish

WHATEVER the metal or the method of machining, you can cut faster, better, and more economically with *Texaco Cutting and Soluble Oils.* These superlative cutting fluids not only bring you the benefits headlined, but assure more cuts per tool grind, less downtime for tool changes.

There is a complete line of Texaco cutting fluids, each designed to improve the efficiency of a particular type of cutting. Each has been developed through careful research and practical field applications . . . and each is kept abreast of advances in metallurgy and machining techniques by the continuing work of The Texas Company's staff of research chemists and engineers.

A Texaco Engineer specializing in cutting coolants will gladly help you improve your machining procedures. Get in touch with the nearest of more than 2300 Texaco distributing plants in the 48 States, or write to The Texas Company, 135 E. 42nd St., New York 17, N. Y.

RECONVERSION RUSTPROOFING

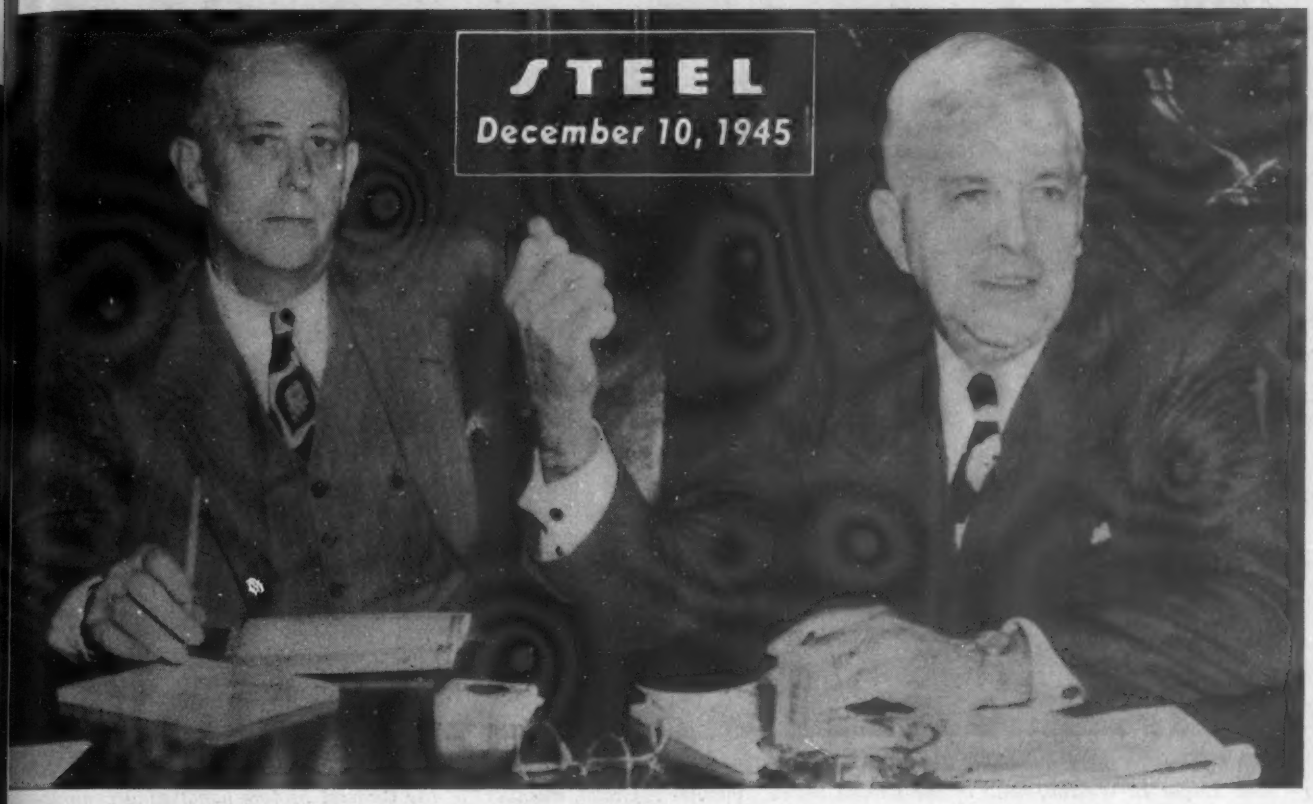
4 Points to Remember

1. Ordnance Specification P.S. 300-4 contains *official instructions* for the complete processing of Government-owned production equipment.
2. These instructions require that only rustproofing materials meeting Government specifications be used.
3. *Texaco rustproofing products meet Ordnance specifications for application on Government-owned equipment.*
4. For full information, see your Texaco representative or write to us.

TEXACO

TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHTS ★ METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS



H. W. Anderson, vice president, and C. E. Wilson, president of General Motors Corp., at a press conference explaining issues in the strike which has closed the corporation's plants in 20 states. NEA photo

Hope for Industrial Peace Rises

Signs point to possible early settlement of wage disputes in basic industries. CIO split with administration seen as Murray denounces Truman plan. Steelworkers' policy committee to decide on strike this week

PROSPECTS for early peace on the turbulent industrial front appeared brighter at last weekend.

With wage negotiations between striking auto workers and General Motors Corp. resumed, speculation leaned toward the view early settlement of the auto strike was more than a possibility.

Some observers seemed of the opinion the reopened negotiations signified the union's desire to settle the strike in an effort to forestall labor legislation suggested by President Truman last week. It was thought in some quarters, the union might be willing to recede from its 30 per cent wage increase demand.

Whatever terms are used as the basis for settling the General Motors strike, it was said, might in all likelihood prove the pattern for settlement of wage demands in steel and other basic industries.

President Truman's plan for setting up fact-finding boards and providing for 30-day cooling off periods before strikes can be called in the basic industries received a cold reception from labor and at best a lukewarm one from industry.

Organized labor is almost unanimous in its opposition to the proposal. CIO President Philip Murray broke off the 10-year honeymoon of his union and the national administration in a radio address in which he condemned the President's proposal and berated the administration. Leaders of other unions likewise denounced the plan.

Nor did Mr. Truman's proposals find enthusiastic approval in the ranks of management. Industrial leaders noted weaknesses in the program. Unless many attitudes within and without government are changed, they believe the President's program may prove to be just as ineffective as the labor-management parley.

In Congress, the proposal was much more popular and members moved to enact the requested legislation without undue delay, although it was predicted the bills originally introduced would gather numerous amendments, adding penalties for strikes before final enactment.

Leaders of the auto workers' union outspokenly opposed the plan as a means of settling the GM strike. The United Steelworkers are expected to follow the lead of Mr. Murray, and the union's wage policy committee, meeting in Pittsburgh this week, will decide whether or not to call out the steelworkers.

High union officials refused to give any indication as to the action that will be taken by the committee, although rumors in steel circles hinted at the possibility of a strike over the Christmas holidays.

The steelworkers have authorized the calling of a strike in National Labor Relations Board elections held Nov. 28 among employes of basic steel producers. Such a strike, if called, would be a "clear violation of existing contracts" which contain no-strike provisions and which continue in effect until October, it was pointed out last week in a radio address by E. G. Grace, president, Bethlehem Steel Co.

President Truman's plan for attempting to settle major industrial disputes was offered Congress soon after the adjournment of the labor-management conference, which failed to reach agreement on methods for minimizing such disputes (see page 92). The Chief Executive asked Congress to enact legislation similar to the Railway Labor Act and at the same time announced he was appointing fact-finding boards to study and make recommendations for the settlement of the GM strike and for the prevention of a

Top officers of the United Automobile Workers-CIO confer with Edgar L. Warren, head of the United States Conciliation Service, on the automotive strike situation. Seated, left to right: R. J. Thomas, UAW president, and Mr. Warren. Standing: Charles L. Oswald, Louis Adkins and Edgar L. Crago, members of the General Motors negotiating committee; Norman Matthews, director of Chrysler division; Richard Frankensteen and Walter Reuther, vice presidents

strike against the United States Steel Corp.

The legislation proposed by the President would provide that on certification by the secretary of labor that a dispute would vitally affect the public interest, the President would be authorized to appoint a fact-finding board.

The board, consisting of three outstanding citizens, would make a thorough investigation of all the facts, with power to subpoena individuals and records.

During the five days between certification and appointment of the board, during the 20 days of study by the board, and for five days after the board submitted its recommendation, strikes would be outlawed.

No penalty except the force of public opinion was proposed in case employers or workers refuse to abide by the fact-finding boards' recommendations.

"The parties would not be legally bound to accept the findings or follow the recommendations of the fact-finding board, but the general public would know all the facts," the President told Congress. "The result, I am sure, would be that in most cases both sides would accept the recommendations as they have in most of the railway labor disputes."

Mr. Truman asked Congress to rush through this legislation—"certainly before its Christmas recess."

Legislation patterned after the President's recommendations was introduced in the House last week under the auspices of the House Labor committee by Rep. Robert R. Ramspeck (Dem., Ga.). Similar legislation was being prepared for introductions in the Senate.

Railway Labor Act's Success Attributed To Good Faith of Unions and Management

THE Railway Labor Act, after which President Truman has asked Congress to pattern new labor legislation, has worked reasonably well. Enacted in 1926 and amended in 1934, the act provides for an orderly method of adjusting disputes in the railroad industry. It contains the fact-finding provisions now advocated for other basic industries of the nation by the Chief Executive.

Under the act it is the duty of labor and management to give each other ten days notice for a conference to make any changes in wages, working rules or other procedure. Conference must be held within 20 days from receipt of such notice.

If direct negotiations between the two parties fail, either side may invoke the services of a mediation board provided for in the act or the board may offer its services. If the board fails to bring about an accord, it may offer voluntary arbitration. Either side may refuse to arbitrate, but if arbitration is accepted the act outlines the procedure to be followed.

If arbitration is refused, the board is required to notify both parties that its efforts have failed and for 30 days thereafter no strike may be called, no rules changed.

An emergency board is named by the President when either side precipitates a crisis. Usually, if arbitration is refused, the unions take a strike vote. This is considered an emergency and the President names a fact-finding board to study the case and make recommendations.

The board's recommendations are not compulsory on either side but usually are accepted. However, in case either party refuses the findings, further conferences are held and the disputes usually have been settled by some compromise without a strike. Public opinion, focused on the issues during the various stages, usually has compelled an agreement.

Outstanding safeguard in the act is that while this procedure is underway neither side is permitted to act; employees are not permitted to strike and employers cannot change the rules.

Only notable case in which the procedure broke down was two years ago when the administration's economic stabilizer changed a fact-finding board's award. This led to a strike vote and temporary seizure of the roads.

Considerable doubt exists as to whether a similar act would work as well in other basic industries and with other unions. The railway brotherhoods generally are well disciplined, led by men of experience and responsibility and whose aims do not include shouldering management out of management's functions, changing the economic system or obtaining their objectives through the favors of the administration in power.

Automobile Workers Hostile to Fact-Finding, Cool-Off Program

Union expected to reject proposal that General Motors workers return to job pending study of case by President's board. Industry spokesmen dubious about efficacy of proposed legislation. General Motors and UAW resume negotiations

DETROIT

REACTION along the automotive front to the President's plan for fact-finding boards to examine disputes in basic industries, for outlawing strikes for 30 days during the meetings of such boards, was highly unfavorable as far as UAW-CIO leaders were concerned, and noncommittal as far as industry was concerned.

Telegram asking striking General Motors workers to return to their jobs immediately pending determinations of a fact-finding board, as yet unnamed, was received at union headquarters here last Monday. Reply of R. J. Thomas, union president, stated a conference of 200 GM union local delegates would be held Dec. 8 to act on the President's proposal. It appeared certain the plan would be rejected, probably unanimously.

After making this announcement, Thomas and Walter P. Reuther, UAW-CIO vice president, immediately left for Pittsburgh to go into a huddle with Philip Murray who was in process of revising his radio address in which he broke with the federal administration.

Negotiations between General Motors and the union were resumed Thursday on all points of their dispute following the ruling by Economic Stabilization Administrator John C. Collet that wage advances up to 33 per cent over 1941 could be used as the basis for requests for price increases.

Reuther's Position Precarious

Reuther has gotten himself into quite a hole on the GM strike, since he is supposedly the master-mind behind it, and the dispute has now pushed itself to the Presidential level. Refusal of strikers to return to work at the President's behest will only further blacken the UAW in the eyes of the public, and rumors are heard around Detroit to the effect Reuther may be "on the way out" of the union's administrative family.

The fine hand of the Thomas-Reuther duo could be seen running all through Murray's radio address. Repeated references to the discredited OWMR report on wages doubtless came from this direction, as did most of the accusations against General Motors, which actively participated in collective bargaining with the UAW until a strike was called, making in fact two offers of wage settlements which involved appreciable increases, both being rejected summarily by the union, without study. For its part, the UAW has done no bargaining at all, taking the position of a 30 per cent increase "or else." The "or else" of course has now happened.

Murray's charge that industry is withholding production from the market because of the yearend tax change is ridiculous, as far as the automotive industry is concerned. Every possible expedient has been used to get automobiles in the hands of dealers. For example, cars have been shipped without bumpers, door handles, and many other parts, just to get them to showrooms. As far as profits are concerned, the automotive industry recognizes it will lose money on whatever production it can eke out for several months until volume moves up to around 50,000 cars a week, so there is no incentive to hold back finished cars.

The automotive industry is very dubious over the efficacy of labor legislation of the repressive or coercive type which Congress is now of a mind to enact. Sensible though it may be, there is just no way to enforce such legislation short of civil insurrection and the industry has been through that mess once, not relishing the thought of a repeat. It is also not too favorably inclined toward fact-finding boards and publicity as a means of ending disputes. The facts are pretty well delineated by now and it is more a matter of whether the union is going to believe them or not.

Leo Wolman, one time chairman of the labor advisory board attached to NRA, in a speech before the ASME in Detroit last week charged the Truman labor peace proposal would bring a new type of industry under government control.

Negotiations between Ford and the UAW have been postponed twice at the union's request so it could have more time to prepare a guarantee of security against wild-cat strikes which would not involve the $5 per man per day assessment suggested by Ford. The company remains adamant in the position that before any consideration can be given to wage increases, some means must be found to spur lagging productivity and to put an end to incessant work stoppages.

Negotiations between the UAW and Chrysler over wage increases and other contract changes broke down Wednesday and the corporation's contract with the union was terminated after it had rejected an offer by the corporation to extend the old contract for one year. Prior to this the union had suggested extending the contract until Jan. 15. Termination means Chrysler union members are now working without a bargaining agreement, but it is believed they will stay on the job in line with union strategy to blockade a single producer at a time.

Returned veterans of World War II, employed by General Motors until the strike put them on the picket line, parade before the Michigan Unemployment Compensation office in Detroit. They claim unemployment compensation is guaranteed them in the G. I. Bill of Rights. Michigan law does not recognize their claim for benefits while on strike. NEA photo

Seeks Aid for Small Steel Mills

OPA moves to develop program to assist nonintegrated producers. Small interests in precarious position under pricing setup

REPRESENTATIVES of the Office of Price Administration meet this week with steelmakers in an effort to work out a solution of the problem confronting the small nonintegrated steel mills. Squeezed between high production costs and frozen ceiling prices, and faced with increasing difficulty in obtaining from integrated producers necessary semifinished steel to sustain operations, the small mills are fighting with their backs to the wall to stay in business.

One meeting will be held in Pittsburgh Dec. 10 to which all steelmakers have been invited to send representatives. A second meeting will be held with the General Steel Products Industry Advisory Committee in New York City, Dec. 12. Price action with respect to only the small nonintegrated mills will be discussed at both meetings.

Some nonintegrated companies are experiencing hardship because their production costs have increased as a result of changeover of production from wartime to peacetime products, and, on Nov. 23, Price Administrator Chester Bowles said their ceiling prices would be discussed with members of the General Steel Products Industry Advisory Committee as soon as a meeting could be called.

TRAIN RADIO TESTED: R. W. Brown, president, Reading Co., talks from locomotive to distant yardmaster as the Reading railroad starts testing a new high frequency radio system at its Wayne Junction yard, Philadelphia. Left to right: Albert J. Moser, engineer; Mr. Brown; Russell Maguire, New York, president of Maguire Industries Inc.; and W. G. Curren, Reading vice president. NEA photo

Promises Price Review in 1946

In his Nov. 23 statement, Mr. Bowles said OPA found no cause at this time for a general increase in steel prices. He promised, however, that the situation with regard to general steel prices would be reviewed when the next financial returns from the steel companies are submitted to the agency after Jan. 1, 1946.

Mr. Bowles, however, said OPA is deeply concerned over the fact that many of the small nonintegrated steel companies are in financial hardship, and said that action would be taken to relieve their situation insofar as relief could be provided by price action.

It is emphasized in industry circles, however, that the problem of small nonintegrated mills involves more than the question of prices. It also concerns the question of raw material supply in the form of semifinished steel for which the smaller interests are dependent upon the larger producers. For some time past the supply of semifinished has diminished. Various reasons have been ascribed for this, among them the fact the integrated mills cannot sell semifinished at present ceiling prices and cover their production costs. Refusal of OPA to grant the larger producers price relief even on semifinished, consequently, is forcing them to withdraw from the market. This is said to be especially true with respect to merchant sheet bar.

It is reported the integrated mills are losing $5 a ton and more on sheet bars and other semifinished items. This is said to be the fundamental reason behind one large steel producer's plans to withdraw from the merchant sheet bar business. It also is said to have figured in considerations affecting the recent sale by Carnegie-Illinois Steel Corp. of its Farrell Works to Sharon Steel Corp. The Farrell Works has annual semifinished steel capacity of 484,500 gross tons.

Although nonintegrated mills are actively seeking a more adequate steel price structure, they currently are more concerned over the question of where they will get an uninterrupted supply of sheet bars than they are over action on their requests for price relief which has been on file with OPA for some time. Their predicament has been heightened by the uncertain future operating status of Sharon Steel Corp.'s Lowellville, O., plant now that Sharon has purchased the Farrell Works.

Some of the nonintegrated mills which are keenly interested in the eventual status of the Lowellville plant, and which formerly relied to considerable extent on the Farrell Works for their supply of semifinished are: Apollo Steel Co., Apollo, Pa.; Mahoning Valley Steel Co., Niles, O.; Reeves Steel & Mfg. Co., Dover, O.; and Superior Sheet Steel Co., Canton, O.

Aside from the question of prices most integrated mills are having difficulty meeting their own semifinished requirements due to the coal strike interruption, labor shortage and other factors. Even if excess semifinished steel capacity were available it would be to the advantage of the integrated mills, under present OPA price ceilings, to restrict output to finishing mill requirements and thus realize a more favorable return on operations resulting from sale of finished products.

Collectively the nonintegrated mills have an estimated annual sheet capacity of close to 400,000 tons. Should these small mills be forced to close because of the inability to obtain sheet bars, their customers will face the serious problem of obtaining sheets and strip requirements at this time because all integrated producers have established a voluntary distribution policy of the available production based on prewar customer rela-

tionships, and orders already accepted but not scheduled are said to represent the entire 1946 output.

Nonintegrated mills have order backlogs extending through the first half of next year, and claim they would be booked through 1946 if they were in position to accept all tonnage offered them. Reflecting the uncertainty of future operations, a number of these interests have not accepted any new tonnage for several weeks.

Representatives of the semi-integrated and non-integrated companies are supplying additional financial data in backing up their requests of long standing for price relief. There has been some discussion over the possibility of lifting price controls entirely for the non-integrated producers. This is not generally acceptable by the industry committee members, for it would place them in the official position of having to operate on a premium price basis, which would be non-competitive in normal times, and would not be necessary if the OPA would grant the steel industry adequate profit margins on their semifinished and finished steel products.

Price Relief Appeals Allowed if Wages Have Risen 33% Over 1941

PERMISSION to industry to apply for price increases to offset wage boosts up to 33 per cent over levels in effect in January, 1941, was granted last week by Stabilization Administrator Collet in new regulations based on new Labor Department cost of living estimates. Heretofore, wage increases up to 30 per cent above the January, 1941, date were used as the basis for requesting price increases.

To what extent liberalizing of the government's policy will affect current wage controversies in industry was not immediately clear. At the same time it was not certain that the new policy would permit immediate price increases up to the new level since it is possible the Office of Price Administration may wait to see whether expected high production and possible lower costs might make price increases unnecessary.

Under the new policy the Stabilization Office takes cognizance of a new Labor Department estimate that living costs have increased 33 per cent since January, 1941, if deterioration in quality of some goods is taken into consideration.

The Labor Department previously had estimated that living costs based on prices had risen 29.5 per cent since 1941. A special presidential committee headed by William H. Davis reported last spring that an additional 3 or 4 per cent should be added for depreciation in quality of goods and absence of cheap items.

The new regulation states: "In acting upon wage increases to compensate for the rise in cost of living, the wage or salary stabilization agency will use 33 per cent as the percentage increase in the cost of living between January, 1941, and September, 1945. The 33 per cent figure will be applied where the percentage increase in average straight time hourly earnings in the appropriate unit of employees since January, 1941, has not equalled the percentage increase in the cost of living between those dates.

"The stabilization administrator has been advised by the Department of Labor that this figure most accurately reflects the increase in the cost of living between those dates."

The regulations revise the procedure for obtaining price relief, and require submission of an operating or financial statement to the price administrator reflecting the effect of the wage increase on costs or showing the employer's profit position for the prescribed test period.

Price increases are to be limited "to the fullest practicable extent" to cover only wage increases which the employer already has put into effect. Stabilization agencies shall not consider a proposed wage or salary increase conditioned on obtaining higher prices, Mr. Collet said.

Present, Past and Pending

■ GOVERNMENT SETTLES STUDEBAKER WAR CONTRACT CLAIMS

SOUTH BEND, IND.—Government has settled with Studebaker Corp. all claims involved in $110 million worth of terminated military truck contracts. A total of 445 claims from 367 subcontractors was included in the final agreement, reported the largest of its kind thus far approved from a V-J Day termination.

■ CPA SEEKS MORE STEEL PRODUCTS FOR PROMPT EXPORT

WASHINGTON—Civilian Production Administration's Steel Division will meet with the Steel Products Industry Advisory Committee at CPA headquarters in New York on Dec. 13 to discuss possibilities of releasing more steel products for quick shipment to Europe for rehabilitation purposes.

■ SEPTEMBER MANUFACTURING EMPLOYMENT DROPS SHARPLY

NEW YORK—Employment in 25 manufacturing industries surveyed by the National Industrial Conference Board slumped 12.1 per cent in September, the greatest decline ever recorded since such statistics have been collected. The board's index of employment dropped to the lowest level since September, 1940, and was 31.8 per cent below the peak of October-November, 1943.

■ EMPLOYMENT IN WAR PLANTS HAS BIG POTENTIAL

WASHINGTON—Iron and steel industry is estimated to have potential employment for 66,000 workers from new plants and facilities built by government in war, if it were possible to convert readily-usable government plants to peacetime production, Civilian Production Administration reported last week. Report estimated potential from nonferrous metal facilities at 75,000 workers and from various other manufacturing plants at 66,000.

■ BRAKE SHOE MAKERS MAY APPLY FOR "CC" RATINGS

WASHINGTON—Brake shoe manufacturers have been declared eligible to apply for "CC" ratings for purchase of bottleneck materials, principally sheet and strip steel, to meet critical shortages.

■ FILE PRIORITIES APPLICATIONS THROUGH WASHINGTON

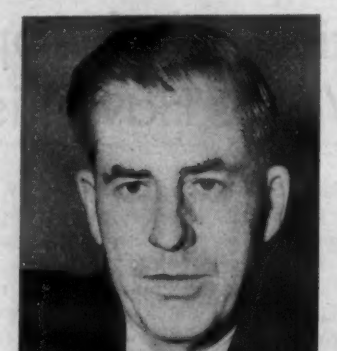
WASHINGTON—All Civilian Production Administration field offices will close Dec. 31. Applications for priorities assistance now must be handled through the Washington office. Application forms are obtainable in post offices of cities where field offices formerly were located and at Smaller War Plants Corp. field offices.

Steel Freight Hearing Put Off Until Mid-January

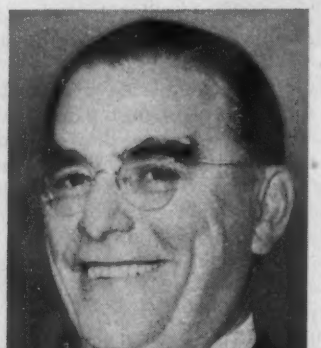
Hearings on the request for a 25 per cent freight rate reduction on steel products covering shipments from midwestern points to Atlantic ports for further shipment to the Pacific Coast have been postponed to mid-January. The original date set for the meeting, at Buffalo Dec. 12, conflicted with another hearing at St. Louis dealing with fabricated steel.

The request for lower freight rates, initiated by U. S. Steel Corp., is expected to have support of steel producers in the Pittsburgh, Youngstown and Cleveland areas. Some interests are said to be shying away from West Coast tonnage due to the high freight absorption necessary and substantial loss incurred on shipments to that point.

FREDERICK C. CRAWFORD



HENRY A. WALLACE



IRA MOSHER

Reconversion Difficulties Probed by Industrialists at NAM Convention

Speakers emphasize importance of production in achieving a sound, prosperous postwar economy. Mosher reports on Management-Labor Conference. Secretary Wallace says greater worker productivity essential to rise in real wages

WITH emphasis upon the need for production, leading speakers at the Congress of American Industry, the fiftieth annual meeting of the National Association of Manufacturers, in New York last week discussed ways and means for getting business and industry back on a sound road to reconversion and a prosperous postwar era.

With strikes and other labor disruptions to output on an ever increasing scale since the end of the war and with still other major disruptions threatening, much attention was directed to management-labor problems, with due reference to legislative, public relations and other phases. However, still other matters bearing on the development of a sound economy came in for searching review, such as taxes, foreign trade, patents and industrial research, and price control and other governmental activities.

Designated as the golden anniversary of the association, the meeting attracted approximately 4500 industrialists, the largest gathering in the history of the organization. It was held at the Waldorf-Astoria, Dec. 5-7, concluding with the annual dinner Friday evening.

One of various interesting features was a symposium on atomic energy and its application to industrial uses, with nine scientists comprising the panel and with Dr. James B. Conant, president, Harvard University, serving as moderator. This, it is pointed out, was the first time since the end of the war that the industrial future of atomic energy was discussed publicly by those who shared in the harnessing of the atom.

Stressing the importance of greater production, F. C. Crawford, president, Thompson Products Inc., Cleveland, and chairman of the NAM executive committee, declared that, "If a better national welfare is to be created, it must come, not from the activities of the social and political groups, but from increased production of our mines, farms and industries."

He charged management with the responsibility for seeing that the country gets this increased production. Its duty today, he said, is zealously "to promote and practice every policy that consistently, and with fair regard for human values, will increase productivity."

The "musts" for management, he declared, are relating wages to production, seeking new and better tools, and challenging any proposal which interferes with the free operation of the basic facts of American productivity. The speaker believed that too few managers realize that human relations are the most important tool for producing the goods and services this country requires.

So much has been said about jobs and wages, and so little about production that many people have lost sight of the only means by which Americans can create the wealth needed to satisfy the American consumer, worker and investor, Mr. Crawford declared. He laid down the following fundamentals, as they appeared to him: 1—We must produce more to have more; 2—Production is the source of purchasing power; 3—High quality of product and fair prices; 4—No person can long be paid a wage that exceeds the value of his production; 5—Industry cannot provide better tools unless industry is profitable and attractive to investors; and 6—Without profits, no new jobs can be created and no higher wages can be made possible.

Ira Mosher, president, Russell Harrington Cutlery Co., Southbridge, Mass., and retiring president of NAM, likewise saw full production as the shortest cut to greater prosperity, and charged labor with causing the breakdown of the recent management-labor conference in Washington through which it was hoped present nation-wide disruptions of output might at least be reduced.

Reporting for the first time to industry on the results of this conference, he said that where management went prepared with specific suggestions and recommendations, labor on the other hand, had no such program.

"Its stock answer to everything suggested by management was 'no' and having said 'no' it had nothing else to offer," he said. "Labor refused to accept equality before the law. It refused to give up the right to strike while negotiations were going on. It refused to accept the sanctity of contracts and to provide a practical means for enforcing their provisions. It refused to provide any protection to

employers, employees and the public against representational or jurisdictional disputes."

The speaker also saw a threat to maximum prosperity in the country's present tariff policy. While conceding the tariff had originally played a constructive part in American development, he thought a policy should be adopted which "at every point will be tested by the gage of public rather than private or group welfare, a tariff policy that will cease absolutely to be an instrument of special privilege."

Mr. Mosher hoped management would support President Truman's proposal for "fact-finding" legislation to prevent strikes, but listed five necessary safeguards to win such approval: 1—Limiting fact-finding process to disputes vitally affecting public health and safety and not to general industry; 2—fact-finding board to be appointed "from scratch" for each dispute; 3—board should hear all appropriate witnesses presented by either party, but should not have subpoena power to undertake "fishing expeditions" into the confidential affairs and records of either union or company; 4—board should be limited to finding of facts and should not take sides by issuing recommendations for the settlement of disputes; and 5—strict reinforcement of the principle that the status quo must be maintained by both parties during the fact-finding procedure.

Deflationary Forces Strong

Secretary of Commerce Henry A. Wallace declared that "both inflationary and deflationary forces are at work and the deflationary forces threaten to last a good deal longer."

He asserted that "the drastic cutbacks in war production are reducing the income of wage and salary earners, that furthermore, farm prices are very sensitive to any drop in consumer power." He predicted that collective incomes of both farmers and wage and salary earners are going to be substantially smaller the next few years than during the war.

"The way to prevent inflation is to hold the line on prices. And the way to prevent deflation is to sustain the volume of purchasing power in the hands of the consuming public," the speaker asserted.

Although long identified with the left-wing of the New Deal, Secretary Wallace made statements which set particularly well with his traditionally more conservative listeners. Thus—"We can't spend our way into good business just by dipping freely into the federal treasury." "Satisfactory profits for stable enterprises and higher rewards for venture capital are essential." And, "Increased output per worker is essential to a steady rise in real wages."

Philip Murray, president of CIO, a scheduled speaker, was unable to be present, his place on the program being filled by his assistant, Van A. Bittner, who emphasized the maintenance of purchasing power as a prime requisite to prosperity.

Promising Future Predicted for Electric Furnace Steel Industry

Cleveland conference told that the electric furnace, properly handled and designed, has just started to come into its own. Use in producing high quality steel pointed out. Present excess capacity seen eliminated

BRIGHT future was painted for the electric furnace at the opening session of the third annual conference on electric furnace steel sponsored by the Electric Furnace Steel Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Hotel Statler, Cleveland, Dec. 4-5, by Harry W. McQuaid, chairman of the committee.

Properly handled and correctly designed, the electric furnace has just started to come into its own, he stated. While there is an excess capacity of electric furnace steel at present this will be eliminated and there will come a demand for new furnaces.

The speaker displayed no pessimism concerning the future of the industry, but drew attention to the fact that the electric furnace occupies a large field in the production of high quality steel for high quality applications.

Another phase just coming into prominence is the beginning of electric furnace steel competition with the open hearth. Mr. McQuaid predicted that the day is coming when high-quality electric furnace steel will be made under a single slag.

The third annual conference was opened by C. W. Briggs, chairman, who announced that the Electric Furnace Steel Committee has now passed the organizational period and is to be considered on a permanent basis. In the future, he pointed out, conferences will be held the first week in December to avoid conflict with meetings of other associations. At a recent meeting of the committee a rotation of officers was decided upon.

Speaking at the dinner Tuesday evening, Dec. 4, James F. Lincoln, president, Lincoln Electric Co., Cleveland, declared that an incentive system of management, based fundamentally on the liberty of the individual, is the answer to the problem of labor-management relations.

Discuss Four Methods for Producing Copper Tubing

Four methods employed in the manufacture of copper and copper alloy tubes were explained to members and guests of the Cleveland chapter, American Society for Metals, last week, by Dr. D. K. Crampton, director of research, Chase Brass & Copper Co. Inc., Cleveland. These were shell casting, piercing, extrusion and cupping.

Shell casting, the oldest method, is little used because it cannot compete with the other processes, the speaker stated. Small shells of clean and sound quality are difficult to obtain by this process.

Discussing the piercing process, Dr. Crampton presented a chart to show how a small amount of phosphorus affected the amount of energy required to pierce the blank. The number of kwh and the time in seconds required to pierce the tube round increased rather sharply as the phosphorus content rose from zero to 0.20 per cent. It was also pointed out that the amount of energy needed for the piercing varied with each lot of copper even though phosphorus content was kept under control.

Two other factors touched upon by the speaker were location of the mandrel and the crystalline structure of the copper or copper alloy being worked. For best results the point of the mandrel—whose function is to enlarge and smooth the bore—should be located slightly off center of the work rolls and on that side of the center which is opposite the entering billet. Columnar lamellar structure requires less energy for fissuring than does the equiaxed.

Concentricity of the piece is of great importance in the process of tubemaking by extrusion. It was pointed out that a short billet gives a better concentricity than does a large billet and that length and temperature of billet must be carefully controlled so that extrusion is performed at the full capacity of the press. These particular points are observed so that sufficient cold work is rendered to the tube to give increased physical properties. A small grain structure produces the best quality product.

The cupping process involves successive cupping operations and, when the work is of sufficient length, it is then handled by conventional methods. Although uniform wall thicknesses are obtained by this method, its disadvantages of high scrap loss and production costs make it unfavorable for all but large size tubes.

In comparing the four processes when the starting tube size is up to 5 inches, extrusion is the preferred procedure for all copper alloys with piercing being the second choice. When sizes are from about 5 inches to about 14 inches the shell casting method is favored.

CLAYTON GRANDY

Warehouse Problems Discussed

Steel jobbers, meeting in Cleveland, told of federal policy with respect to wage and price determination

WARREN M. HUFF

DETERMINATION of steel prices and wage rates must be made by industry, rather than government, if the free enterprise system is to be preserved, Warren M. Huff, price executive, Metals Branch, Office of Price Administration, said last week addressing the fourth annual meeting of the Steel Products Warehouse Association Inc. in Cleveland.

For this reason and in view of the temporary nature of the abnormal conditions now prevailing, the government believes industry should make this determination under rules already promulgated, he declared.

After reviewing the wartime steel price history, Mr. Huff reiterated OPA's reasons for rejecting the steel industry's request for a price increase. OPA believes that substantial decreases in steel production costs will develop during 1946. He said that several applications for relief from financial hardship have been received from small nonintegrated steel companies and that prompt action would be taken by OPA.

Clayton Grandy, president of the association, listed the following as being the important problems now facing the steel warehouse industry: (1) The current constriction in steel supply brought about by the extraordinary demands or reconverting manufacturers, the shortage of steel-producing manpower, and the industrial battle between increased wage demands and frozen price ceilings; (2) the obligation placed upon the industry to protect itself against the absorption of anticipated increase in mill base and extra prices; (3) the urgent need to secure a more equitable redistribution of surplus steel resulting from war contract terminations; and (4) the preparation of plant, inventory, and personnel to serve the reconversion and postwar markets for steel.

Noting the pressure for steel deliveries, Mr. Grandy said producers have taken the logical step to apply a measure of control by placing restrictions on orders acceptance, and by allocating quotas on the basis of previous customer experience. "The question arises," he continued, "whether demand has not been in excess of actual requirements and whether a speedy enforcement of the inventory controls by CPA would not supply a partial remedy."

He said OPA's delay in announcing general steel price adjustments is having serious repercussions. Data developed by the association fully supported its petition for relief from further absorption of expected increases, and will undoubtedly be of prime use when the price situation is reviewed after Jan. 1.

As the shortage of desirable steel products became more acute, interest in the purchase of surplus steel has become a dominant interest of steel distributors. Mr. Grandy said there have been many difficulties and dissatisfactions in the way of translating that interest into actual purchases. Many complaints have been received by the association against the practices and procedures of the disposal agencies and these will be taken to the top-policy level of Surplus Property Administration through the Industry Advisory Committee for Reusable Steel Products.

Surplus Disposal Policy Outlined

Guy P. Norton, director, Materials Division, Surplus Property Administration, explained the policy which has been adopted in the disposal of surplus property and the many problems encountered in carrying out that policy. As an indication of the size of the job, it has been estimated that declared surplus may reach $32 billion in 1946.

"It is a basic policy," Mr. Norton said, "to stockpile all surplus strategic minerals and metals other than fabricated articles. Fabricated articles of which the principal components by value consist of strategic minerals and metals may also be stockpiled if suitable for Army and Navy needs. However, such stockpiling is not intended to interfere with the immediate civilian needs of the country and real shortages in civilian requirements will be met before surplus material is placed in the strategic stockpile."

Actual sales practices in the disposal of surplus property were explained by Henry W. Cornell Jr., assistant director, Producers' and Capital Goods Division, Office of Surplus Property, Reconstruction Finance Corp. Usable material for which there is a known market and use is priced to sell in volume, taking into consideration all factors such as conditions, sizes, alloys, location and the fact that the buying is from an intermittent source of supply. All other material which is nonstandard or in amounts of $300 or less is offered by sealed bids and in some instances may be auctioned off.

In cases where demand exceeds the supply of any metal, RFC endeavors to divide the material fairly and to do the most good. Generally, a proportion of 10 to 15 per cent is set aside to warehouses.

J. R. Stuart formerly chief, Warehouse Branch, Steel Division, War Production Board, and now associated with E. F. Hutton & Co., New York, said the warehouse industry was reasonably well prepared to undertake its responsibilities during the reconversion period. In substantiation of this statement, he pointed out that the warehouse industry had more inventory of hot-rolled sheet and strip on June 30, 1945, than at any other time during the war and that to a lesser degree the same was true of cold-rolled sheet and strip.

"If labor problems in the steel industry do not become too severe," he said, "I think I can assure you that your present unsatisfactory position is a temporary one."

He warned the warehouse industry of the possibility of an extensive revision of the steel industry basing point system of pricing.

"For example, those of you who operate multiple warehouses and make delivery of odd sizes and gages from your warehouses most favorably located to the present basing point for those sizes," he explained, "might suddenly find that establishment of a new basing point would force you to revise your entire dis-

ribution program insofar as odd or slow-moving sizes are concerned. The warehouse which is now large enough to stock such items in addition to the faster moving material, might suddenly be too large, whereas another location might well be far too small."

L. S. Hamaker, assistant general manager of sales, Republic Steel Corp., Cleveland, in his address on "An Appraisal of the General Business Outlook" said the steel industry faces capacity operations for at least three years and perhaps longer. Reviewing the large markets for steel, he pointed out the automobile industry estimates that if it operates at a five million car annual rate it will take until 1950 to catch up with its present backlog of unfilled demand; the market for homes is estimated at 1 million houses a year for at least ten years.

The railroads, he said, will require great tonnages for deferred maintenance alone; are not expected to embark on an extensive program of new freight car buying but will have a normal replacement volume of around 85,000 cars a year; and are planning, or have on order, lightweight, high-speed passenger equipment.

The following were elected to the board of trustees of the association: Phillip P. Brown, Reliance Steel Division, Detroit Steel Corp., Detroit; Warren S. Garvey, Guardian Steel Corp., Detroit; Bernard Gordon, Caine Steel Co., Chicago; H. B. Hoffman, Wilkoff Co., Youngstown. J. D. Finnegan, Haynes Steel Products Co., Youngstown, and L. J. Carolin, Stanton Steel Co., Detroit, were elected first and second vice presidents, respectively. Other officers were re-elected.

Justice Department Program in Aluminum Held Employment Check

Chairman of Aluminum Co. of America, in letter to attorney general, says Justice Department's proposal to break up company into regional units to achieve ideological aims would penalize efficiency, kill growth and curb job chances

THE DEPARTMENT of Justice's aluminum program, in order to achieve ideological aims, sacrifices the chance to expand employment, Arthur V. Davis, chairman, Aluminum Co. of America, Pittsburgh, declared in a letter to Attorney General Tom C. Clark last week.

He charged the plan " is bound to destroy the growth possibilities of the aluminum industry," and added that "it just doesn't make sense" to seek military security by breaking up Alcoa in order to substitute for it a number of smaller and less efficient producers.

The letter was a reply to Attorney General Clark's Sept. 11 report to Congress which advocated breaking up the Aluminum company into regional clusters of competing units.

It said, in part: "Your report recommends to Congress the dissolution of Alcoa for the unique reason that it is so efficient and such a low-cost producer that it will be quicker and easier to break up the organization than to find another company willing to spend the time and money necessary to create a well-integrated, low-cost operation. . ."

Mr. Davis pointed out that a United States Circuit Court of Appeals decided in the government's antitrust suit against Alcoa that the company had no monopoly in any of the raw materials of which aluminum is made nor in any fabricated products, leaving the issue of monopoly open only in aluminum smelting.

"The true road to competition does not lie in breaking up a highly efficient corporation like Alcoa but in finding someone willing to do what Alcoa has done, namely, invest money, time, enterprise and imagination in constructing an equally efficient company," he said.

"The Reynolds Metals Co.," he pointed out "within a few years has embarked successfully upon production and fabrication of aluminum. Any other group of enterprising individuals can do the same."

Mr. Davis summarized Alcoa's war record as further proof of the efficiency of the company in either war or peace. "Alcoa started its own expansion program in the fall of 1938 and spent nearly $300 million in that undertaking in six years.

"The government began its program of aluminum plant expansion in August, 1941, and under that program, Alcoa built $450 million of the most modern and efficient aluminum plants, for the government without fee or profit.

"In addition to the $300 million of its own money which Alcoa used for plant expansion, it provided $225 million of additional working capital required to operate its new facilities and the government-owned plants which it operated under lease.

"Alcoa operated all but one of the government-owned aluminum smelting plants under wartime leases whereby the government received 85 per cent of the profits from operations. The government received nearly $30 million in returns from operations under these Alcoa leases. The government also received more than $20 million from Alcoa under leases of fabricating plants (canceled by the government) and miscellaneous facilities.

"Alcoa produced over 4 billion pounds of aluminum in four years of war, some twelve times as much as it produced in 1939. Its production in the fabricated forms of aluminum increased in even greater proportions.

"The price of aluminum ingot was reduced by successive steps between March, 1940, and October, 1941, from 20 cents to 15 cents a pound, and aluminum pig was brought on the market at 14 cents a pound, in spite of increased operating expenses."

TRANSITION TOPICS

LABOR—President asks legislation patterned after Railway Labor Act and providing for fact-finding boards and cooling off periods before strikes in attempt to achieve industrial peace. Proposal actively opposed by unions. CIO splits with administration. See page 83.

MAHONING VALLEY—Youngstown plans to retain place as nation's fourth largest steel producing district. Industry hopes construction of waterway will afford relief on transportation charges. See page 102.

CONGRESS OF INDUSTRY—Need for high production emphasized by manufacturers studying problems of reconversion. Labor-management, tax, foreign trade, patent, research and price control problems examined. See page 88.

PRICES—Industry and OPA officials studying possible relief for nonintegrated producers. Economic stabilizer rules requests for price increases may be filed if wages have advanced 33 per cent over 1941. See pages 86-87.

CONTOUR FORMING—General purpose benders, so effective on aircraft sections, have functional latitudes needed for forming standard and nonstandard metal parts at low cost. See page 112.

POWDERED METAL ELECTRODES—Alloy welding rods can be made by new process which compacts powdered metals around an iron wire core. See page 130.

Labor-Management Conferees Fail To Reach Accord on Basic Issues

Delegates differ on management's right to manage, equalization of labor and industry responsibility, recommendations for wage increases. Members believe some progress toward industrial peace was made during month's sessions

AFTER four weeks of discussions, generally controversial and often heated, the 36 delegates to the National Labor-Management Conference adjourned Nov. 30, without agreement on the fundamental issues of current, past and present labor disputes.

Principal issues on which the conference was divided were: 1. Labor's proposal to put the conference on record as favoring wage increases; 2. placing of greater responsibility on labor; 3. definition of the rights of management; 4. machinery for settling jurisdictional disputes; 5. unionization of foremen; 6. establishment of fact-finding machinery for settling labor disputes; 7. barring of strikes until all other procedures have failed.

Accomplishments of the conference were agreements on: 1. Further meetings may be called soon to seek agreement on issues still in dispute; 2. strengthening of the United States Conciliation Service; 3. when disputes occur while contracts are in effect, grievance procedures, including arbitration, should be substituted for strikes; 4. all other procedures should be used to settle bargaining disputes before strikes are called; 5. discrimination for reasons of sex, race or religion should not be employed.

While the conference results generally were disappointing, the delegates themselves refused to concede the meeting was a complete failure. They believed important progress was made toward a better understanding between employees and employers and that at least the delegates had come to know each other and each other's problems.

The conference did not fulfill President Truman's hope that it would provide "a broad and permanent base for industrial progress," nor do the results presage any early voluntary agreement that will result in the minimizing of industrial disputes. Following the termination of the conference, many observers were leaning to the belief that enduring industrial peace may necessitate a fa code of laws defining the rights and re sponsibilities of both management an labor and equalizing the obligations o each under such a code.

On the issues on which the confer ence delegates differed, labor and man agement generally voted in blocs wit no dissenting votes within either seg ment to the reports of their delegate on the various committees. The differ ence among labor delegates on th wage issue was a notable exception These reports indicate the cleavage o the fundamental issues.

On management's right to manage the management delegates reported:

"Labor members of the committee o management's right to manage hav been unwilling to agree on any listing o specific management functions. Man agement members of the committee con clude, therefore, that the labor mem bers are convinced that the field of col lective bargaining will, in all proba bility, continue to expand into the fiel of management. The only possible end of such a philosophy would be join management of enterprise. To this th management members naturally canno agree."

Rights Wanted by Management

The management members of th committee enumerated certain right which labor should accord to manage ment. These were arranged into tw classifications.

"The first comprises those matter which are clearly the function and re sponsibility of management and ar not subject to collective bargaining.

"The second comprises matters i respect to which it is the function and responsibility of management to mak prompt initial decisions in order to as sure the effective operation of the en terprise, but where the consequence of such actions or decisions are properly subject to review when they involve issues of alleged discrimination, affec wages, hours, working conditions, o agreed-upon management-labor prac tices. Such matters should be handle promptly under grievance procedure mutually agreed to as being appro priate for each specific item."

Management members took a firm stan against the encroaching of labor union on management functions by attempte large-scale unionization of foremen, al though recognizing that in certain indus tries, such as the building and printing trades, such practices have been lon established and accepted.

"To the foreman is delegated th ultimate responsibility of directing th workmen at the point where they are ac tually engaged in production. Since th foreman exercises managerial authority he must be solely and exclusively re sponsible to higher management.

"Furthermore, under collective bar gaining agreements, the foreman usuall

Judge Walter P. Stacy, center, chairman of the labor-management conference, is congratulated for his service during the sessions by William Green, left, president, American Federation of Labor, and John L. Lewis, president of the United Mine Workers, as the conference adjourned without agreement on the fundamental issues of minimizing disputes. NEA photo

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

A technical magazine states that the war-developed arc-oxygen electrode will cut quarter-inch steel plate at the rate of a foot per second while under 40 feet of water. *Metal and Thermit Corp.*

get ready with CONE for tomorrow

It is estimated that within a few years 80% of the coal mined underground will be removed from the mines on conveyor belts instead of in cars. *Scientific American.*

get ready with CONE for tomorrow

The PV-3 helicopter has a long fuselage with a rotor on each end and carries twelve persons. It is being tested by the Coast Guard and Navy. *Popular Science.*

get ready with CONE for tomorrow

A new cement, for use in concrete flooring, is said to drive away insects, kill bacteria, and prevent the formation of molds. It also dissipates static electricity. *H. H. Robertson Co., Pittsburgh.*

get ready with CONE for tomorrow

An appliance manufacturer announces an electric washing machine that can also, by the use of attachments, wash dishes, peel potatoes, churn butter, and freeze ice cream. *Hurley Machine Division Elec. Household Utilities.*

get ready with CONE for tomorrow

A new gasoline-powered lawn mower resembles a floor scrubbing machine. It is mounted on four wheels and uses a rotary knife revolving at 3,000 r.p.m. *Whirlwind Lawn Mower Corp., Milwaukee.*

get ready with CONE for tomorrow

The manufacturer of the jet engine used in the P-80 Shooting Star prophesies that all transcontinental planes will be jet-propelled within five years. *General Electric.*

One of the war devices that may survive to help the motorist is the tire gauge that registers on the dash, developed for the Army's amphibious "duck." *GMC Truck and Coach Div.*

get ready with CONE for tomorrow

A magnetic survey of the state of Florida shows large areas in the southern part that are favorable for the occurrence of petroleum. *U. S. Dept. of Mines.*

get ready with CONE for tomorrow

Meals are being served in the Naval Air Transport Service that are pre-cooked, packed in a covered paper plate and frozen. On the plane they are thawed and heated in a special oven. *Maxon Sky Plate, W. L. Maxon Corp., 460 W. 34th St., New York.*

Air conditioned trolley cars are being introduced in a Southern city. This is said to be the first use of such equipment in city vehicle transportation. *Atlanta, Ga.-Pullman-Standard.*

get ready with CONE for tomorrow

A new household electric light switch can be set for delayed action up to three minutes. *T. J. Mudon Co., 1240 Merchandise Mart, Chicago.*

get ready with CONE for tomorrow

Rubber V-belts molded around a steel cable have been developed to replace chain drive on Army motorcycles. *Goodyear, Akron 16, Ohio, Whizzer Motor Co., Los Angeles.*

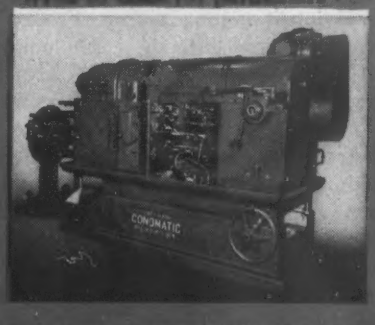
get ready with CONE for tomorrow

Even the common wire nail has been improved. The new type has a notch in place of the point and is claimed to be non-splitting. *E. S. Gair, Snyder, New York, inventor.*

15 *operations in 12 seconds*

The 15 operations that form this washing-machine part of B-1112 steel, including rolling the oil groove* in the outside diameter, are performed by the 8-Spindle Conomatic in 12 seconds.

*Write to Cone for particulars



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

makes the first management disposition of all grievances. With union foremen having supervision of union workmen, the foremen could not receive and act on grievances for the management, since it would mean the unions had taken over both sides of the bargaining table."

Labor members of the committee on management's right to manage cited the wide variety of traditions, customs and practices that have grown up over a long period of time in various industries.

"Because of the complexities of these relationships," they said, "the labor members of the committee think it unwise to specify and classify the functions and responsibilities of management. Because of the insistence by management for such specification the committee was unable to agree upon a joint report. To do so might well restrict the flexibility so necessary to efficient operation.

"It would be extremely unwise to build a fence around the rights and responsibilities of management on the one hand and the unions on the other," the labor members continued. "The experience of many years shows that with the growth of mutual understanding the responsibilities of one of the parties today may well become the joint responsibility of both parties tomorrow. We cannot have one sharply delimited area designated as management prerogatives and another equally sharply defined area of union prerogatives without either side constantly attempting to invade the forbidden territory."

Separate reports also were issued by the committee on representational and jurisdictional questions. Management delegates held that inasmuch as jurisdictional disputes are among contended labor groups, no strikes or work stoppages on this account should be permitted and suggested a set of principles to facilitate the peaceful determination of collective bargaining representatives and of settling jurisdictional disputes.

Labor delegates insisted on utilization of the machinery provided by the National Labor Relations (Wagner) Act.

Management delegates of the collective bargaining committee held that voluntary and just bargaining is impossible under "conditions of force regardless of its source or nature. Voluntary negotiations of free collective bargaining is not possible except under conditions of law and order and the absence of force" . . . . and "with full regard for protection of individuals and property against unlawful acts."

Labor delegates did not subscribe to this provisioin of the management delegates' report. Management delegates further insisted:

"Collective bargaining agreements should be reduced to writing and signed by the parties. The agreements constitute the terms and conditions which govern the wages, hours and working conditions of employees included in the appropriate unit, and which must be observed by management forces and employees and their representatives, for the period of the contract and extensions thereof.

"A profound understanding of mutual rights and obligations of both parties under the agreement is essential to the successful administration of a collective bargaining agreement. It is the responsibility of labor unions and employers to educate their members and representatives as to the terms and conditions of the agreement and the respective rights and duties of the parties under the agreement. Appropriate methods should be employed to assure that the full content of agree-

Some Good Achieved at Conference, Delegates Believe

DELEGATES to the labor-management conference, adjourning without agreement on the fundamental issues confronting the parley, insisted the meeting had not been altogether in vain. The four-week meeting brought together leaders of both sides and gave each a better understanding of the problems of the other. Areas of disagreement were defined. The conference broke up on a friendly basis, with the understanding further conferences may be called soon in an attempt to reach agreement on some of the controversial points.

Following are some of the comments of delegates on the breakup of the conference:

Ira Mosher, National Association of Manufacturers—The public expected too much. We in the conference didn't. If you can define areas of disagreement you have gone a long way toward a solution. The delegates broke on three points but they have a better understanding of these than ever.

Charles R. Hook, president, American Rolling Mill Co.—It is impossible from the reports and the words used on the floor to evaluate the great good that has come about as a result of men of good will and good intent getting together and discussing their problems. I think sincerely that this conference has made a real contribution to the foundation of understanding between the leaders of labor and the leaders of management.

H. W. Prentiss Jr., president, Armstrong Cork Co.—We have accomplished quite a bit in improving the processes and procedures of collective bargaining.

John A. Stephens, vice president, United States Steel Corp.—I think the reports and the individual committee statements, where no agreement was reached, offer a substantial contribution toward the objectives defined by the President.

Philip Murray, president, Congress of Industrial Organizations—I think the conference was worth holding. It made progress. For instance, we have a continuing committee which will be called together when necessary to attempt a resolution of the points of difference. Despite the action of the conference in defeating my resolution on wages, I hope that continuing meetings will meet and overcome many of the obstacles that we were unable to resolve in this conference.

John L. Lewis, president, United Mine Workers—It was advantageously educational.

James Tanham, vice president, The Texas Co.—Four weeks of conference have failed to produce any willingness on the part of labor to provide any method by which its responsibility for its collective bargaining commitments can be assured. The recent oil strikes in violation of contracts and of law illustrate the form of irresponsibility that must be prevented by law. But the conference definitely helped management and labor better to understand each other's viewpoint. In that respect it was helpful and greatly worthwhile.

Fred Clymer, Goodyear Tire & Rubber Co.—From the standpoint of both labor and management, the conference will give the public a crystallization of their fundamental differences. To that extent the conference is a success.

Eric A. Johnston, president, Chamber of Commerce of the United States—The results are going to be disappointing to the public. In a measure they are disappointing to me. But that does not mean we should stop trying to achieve industrial peace by this temporary setback.

William Green, president, American Federation of Labor—In my opinion, much good was accomplished, but I was disappointed over our failure to come to agreement on all the questions submitted to the conference committees.

ments be made known or available to the members of the union and employer group."

Management delegates to the conference on the termination of the meeting released a list of recommendations for minimizing industrial disputes. This proposal was not a conference document, but represented the consensus of the industry representatives. It included general recommendations on collective bargaining, an outline of the functions and responsibilities of management, recommendations for the determination of collective bargaining representatives, suggestions for handling jurisdictional disputes, the making of collective agreements, administration of grievance procedures and utilization of conciliation services.

British Steel Production Above 1935-1938 Averages

Production of pig iron in the United Kingdom during the first 7 months of 1945 averaged 134,071 long tons weekly, according to a trade report received at the Department of Commerce. The output of steel ingots and castings during the same period averaged 216,171 tons per week. The annual rate on this basis is 6,973,142 tons for pig iron and 11,909,285 tons for steel ingots and castings.

Both figures are under the average reported for the production of pig iron and ingots and castings during the 5-year period from 1939 to 1943—7,673,600 tons and 12,860,500 tons, respectively—but compare more or less favorably with averages for the prewar years, 1935-1938. The 1945 rate for pig iron production, for instance, was less than the average of 7,345,000 tons for the prewar years, but the rate for production of steel ingots and castings during 1945 was well over the 11,256,000 ton figure given for 1935-1938. No comparison with production in 1944 is possible in view of the absence of figures for that year.

Presumably the lower production for 1945 as compared with the 1939-1943 period can be accounted for by the stoppage of war orders. It is pointed out, however, that the industry has booked peace orders on a scale sufficient to insure a high level of activity for many months.

Future Exporters Warned By Commerce Department

The Department of Commerce has issued a warning to those intending to enter the postwar export field to look into the market for their particular products carefully.

American business men should not rush into the export trade field until they have carefully analyzed the principal factors affecting the salability of their merchandise, determined that a market exists in the area under consideration, and that they can sell their goods at a profit.

Manufacturers in this category should consider the possibility of selling through export agents or merchants located in this country, the department added. It issues a weekly list of foreign visitors to this country, giving the commodities in which they are interested, the itinerary of each and his address.

BACK TO OLD JOB: Paul V. McNutt, right, former war manpower commissioner, is returning to his former post as high commissioner of the Philippines, where, he says, he will try to bring order out of chaos. Accompanying Mr. McNutt is Frank N. Belgrano, left, former national commander of the American Legion who will serve as Mr. McNutt's financial adviser. NEA photo

Latin American Information Booklets Being Prepared

Progress is being made by the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, in preparing information booklets for the use of United States manufacturers and export and import firms desirous of doing business with Latin American countries.

"Preparing Shipments" is the title of 20 booklets—one for each Latin American country—now ready for distribution. They tell how to package shipments, how to address them, and what forms have to be filled out.

Also ready at this time are 20 booklets—one for each country—setting forth the pharmaceutical regulations of Latin America.

A series entitled "Living and Office-Renting Costs" is being revised.

Also in final preparation is a series of "Foreign Commerce Yearbook"—one for each Latin American country. That for Colombia is ready now while the others will be completed in the near future. These books set forth basic information, such as area and population, production, occupational distribution, climate, health, foreign trade statistics, etc., for each country.

A series entitled "Sales Territories" also is nearing completion. That for Colombia is ready now while those for the other 19 Latin American republics will be ready soon.

The bureau reports that the entire supply of books entitled "Establishing a Business in Peru (and in 19 other Latin American countries)" has been exhausted but that the bureau will be glad to lend file copies to those companies in urgent need of the information.

The bureau's annual economic reviews and trade studies for 1945, it now is expected, will be ready for distribution in December.

Kaiser Pays Off Government Loan On Permanente Magnesium Plant

Full payment made RFC in six years, chiefly from earnings of Permanente shipyards; magnesium plant currently not operating but plans call for resumption of metal production when projected process changes are effected

SAN FRANCISCO

HENRY J. KAISER, who has been unusually absent from the news in recent weeks, has reappeared with announcement that the Permanente Metals Corp., of which he is president, has repaid in full the Reconstruction Finance Corp. loan of $28,475,000 on Permanente's magnesium plant.

The loan, which was of ten years maturity, was paid in six years. In addition to the principal, Permanente paid a total of $3,500,000 interest, which was at the rate of 4 per cent. Payments on the loan were made chiefly from earnings of the Kaiser Permanente shipyards, which were constructed during the war at government expense and earnings from which were pledged against repayment of the magnesium mill obligation.

The Permanente magnesium layout consists of the main mill near San Jose, about 50 miles south of San Francisco, and allied plants at nearby Moss Landing and Natividad. The plant was built in 1941 and during the war produced 20 million pounds of ingot magnesium and 86 million pounds of incendiary material for bombs.

At present the main mill at Permanente is not operating, but the raw material and allied operations at Moss Landing and Natividad are reported to be at capacity producing materials for the use of chemical, rubber, paint, oil, building materials and fertilizer manufacturers. A new refractory brick plant at the Moss Landing site recently was announced.

Mr. Kaiser said that present plans "call for a return to magnesium metal production as soon as process changes can be completed." He also said, "studies and experiments to date confirm the prediction that the plant will be able to compete successfully" in the production of magnesium. However, no mention was made in the announcement as to what process would be used to produce refined magnesium. It was reported during the war that the Permanente process was the most costly of any magnesium producer in the U. S., cost per pound running to about 28 cents.

Simultaneously with announcement of the Permanente loan repayment, Mr. Kaiser released the information that his steel plant at Fontana, Calif., has been awarded a French government contract for 55,000 tons of semifinished steel. The contract was negotiated with the French purchasing mission now in this country.

The 55,000 ton order will be shipped to France in the form of billets to be reprocessed there into finished materials.

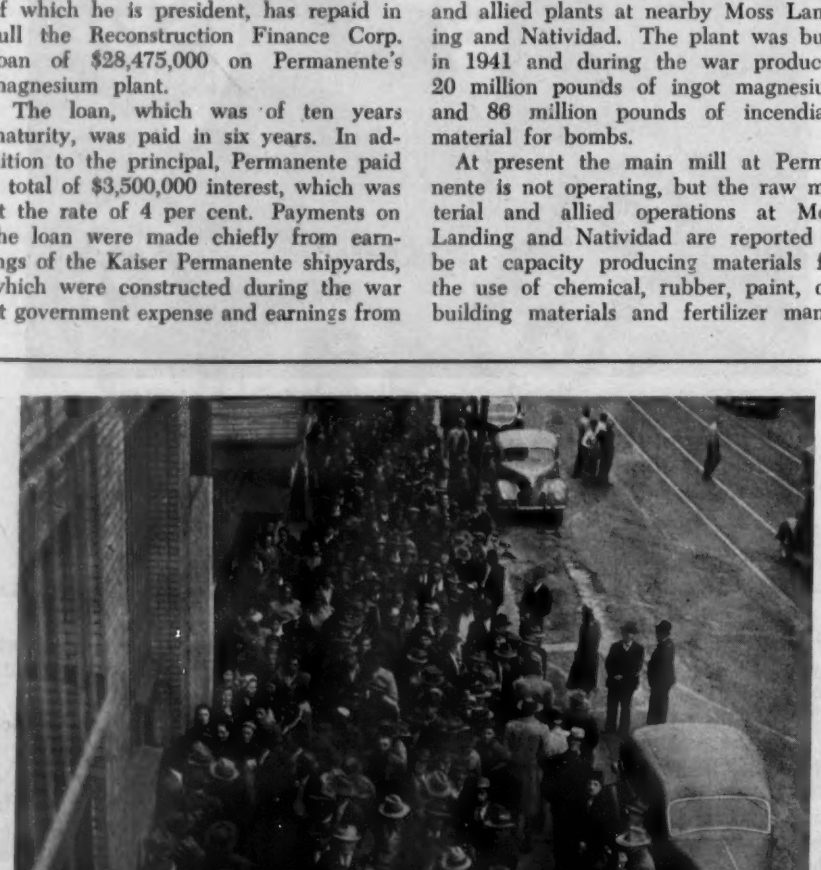
West Coast steel circles have heard rumors recently that new steps may be taken soon to dispose of the Geneva steel mill in Utah.

Expect Call for New Bids

Although there is no confirmation whatsoever, reports persist that Surplus Property Boss Symington will call for new bids on the property as a result of Congress' failure to establish a policy on disposal of the plant. A Senate committee recently conducted a hearing on the property and it has been an active subject of discussion in Congress for several months.

Although Henry Kaiser last summer promoted a syndicate of westerners to take over the plant, nothing has been heard of that effort since the Fontana mill terms were announced by the RFC, and there has been no concerted move by any western group to bid for the plant. From time to time western groups have raised the issue, but in every case their positions have been confined to vague statements such as "Geneva must not be closed," or "westerners should buy Geneva." Some people still think U. S. Steel Corp. may be a possible bidder, despite its announced refusal to bid for the plant and in face of expansion plans it is making for its plants at Pittsburg and Torrance, Calif. It is believed that if the corporation planned to take over Geneva, the expansion would be made there instead of on the Coast.

The most specific offer for Geneva thus far has come from Colorado Fuel & Iron Corp., but its tentative bid is conditioned on an expensive reconversion program which the government would pay for. Some observers think that the Colorado Fuel proposal would require



LONG WAITS: Lines of more than 500 persons form before claims office of the San Francisco branch of the California State Employment office to wait hours to collect unemployment compensation checks. Many prefer to draw the jobless compensation rather than accept jobs at wages lower than they became accustomed to during wartime. NEA photo

more additional money than Congress would be willing to appropriate. The government already has $216 million tied up in the plant.

San Francisco, which is plagued with street transportation problems more serious than at any time in its history and as bad as any in the nation, may get relief next year.

Specifications for ten new streamlined streetcars for purchase in 1946 have been completed by the city's utilities engineers. They will be the first orders under the city's $23 million improvement program.

Call for bids will include an option to purchase an additional 20 of the cars should the proposed fare increase, from 7 to 8 1/3 cents, be approved. The new cars will cost $27,000 each.

During the next five years the city's transportation system hopes to purchase nearly 300 streamlined streetcars as well as trolley coaches and busses.

Factory employment in California in October increased slightly over September. The figures, not including aircraft, shipbuilding and canning, totaled 306,600 in October against 304,300 the previous month.

When the plane and shipbuilding industries, which were abnormally high in wartime, and the canning industry, which is seasonal, are included, the total employment figure shows a decline to 468,000 in October from 515,400 in September.

Shipbuilding employment declined 16 per cent in October to 67,600 from 86,500 in September, and aircraft workers dropped from 59,300 to 52,200.

Bethlehem Will Double Los Angeles Capacity

LOS ANGELES

Details of the Los Angeles expansion of the newly organized Bethlehem Pacific Coast Steel Corp. were explained to newspaper and magazine men recently in a press tour arranged by the company. According to H. H. Fuller, Bethlehem Pacific president, company is planning to expend between $8 and $10 million at Los Angeles within the next 18 months and will increase capacity from the present 117,000 tons of ingots to 240,000 tons (STEEL, Oct. 29, p.82).

L. J. Soracco, superintendent of the plant, and Harvey Hewitt, Southern California sales manager, said new installations will include two new open-hearth furnaces, a new rolling mill, new furnace facilities and a wire mill.

Plant is the second largest producer of nuts and bolts on the coast and makes many types of structural steel. It now operates three 50-ton open-hearth furnaces, which are oil fired. Present rolling equipment includes a 22-inch billet mill and 20-inch finishing mill. Ingots for the mills are heated in oil-fired continuous furnaces.

California's List of Unemployed Up Only 80,000 Since War's End

Although indications are job openings exceed number seeking work, unemployment compensation claims are up sharply. Over 240,000 war workers displaced since August and more than 160,000 veterans returned to state

LOS ANGELES

AUTHORITATIVE appraisal of economic conditions in California was contained in a report submitted last week by business and industry leaders to the board of directors of the State Chamber of Commerce at the close of a two-day meeting in Los Angeles.

According to the report, employment in manufacturing industries in the state decreased by 54,000 since mid-September and by 193,000 since mid-August.

Major decreases have been in the aircraft and parts industries with October employment of 59,300, and in private shipyards, with October employment of 67,600.

Iron and steel products, electrical and other machinery, and nonferrous metals show declines substantially in the same ratios.

Earlier forecasts of large volumes of transitional unemployment during the immediate postwar period have not materialized. Although some 240,000 war workers were laid off between Aug. 15 and Nov. 1, and some 160,000 returning veterans have entered the state during this period, only about 80,000 were added to unemployed lists.

However, the number of unemployed claiming unemployment insurance rose from 16,000 to 137,690, plus some 11,176 compensable claims for veterans.

For the week ending Nov. 15, the number of claims was 135,357 and the number of veterans' claims had risen to 14,504.

Of the 135,357 compensable claims on Nov. 15, some 21,920 were in the San Francisco bay area and 6,664 in the remainder of northern California, while 87,874 were in the Los Angeles area and 18,917 in the remainder of southern California.

During this period, according to the best obtainable evidence, the report continues, jobs available in the state equaled or exceeded the number of persons seeking work.

There is no evidence of any net decrease in population and many of those now temporarily out of the labor market may be expected to return.

Private construction as reflected by building permits issued in California cities rose to $37,889,000 in October, 30 per cent above September levels and three and a half times the $10,544,000 reported in October a year ago.

West Coast writers and photographers are shown during a tour of Bethlehem Pacific Coast Steel Corp.'s Los Angeles plant at which Bethlehem officials explained details of the company's $8 million expansion program. Left in rear row is Howard L. Mann, management representative of the company; third from left is B. H. Brown, chief metallurgist; fourth from left is L. J. Soracco, plant superintendent. Flanking woman writer in middle row are F. J. Fuller, left, STEEL's West Coast manager, and Maurice Beam, STEEL's Los Angeles editorial correspondent

ON WORK BETWEEN 10" AND 20" IN DIAMETER

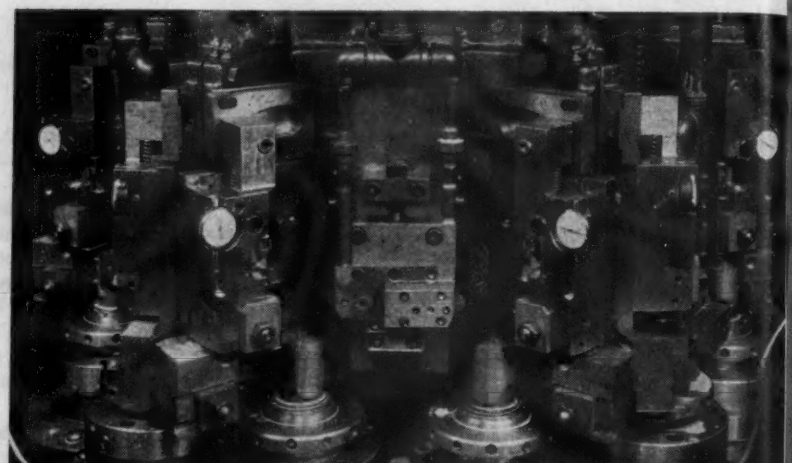
No other Special-Purpose Machine produces so much for so little

If you are interested in a time-tested method for getting maximum production at lowest unit costs without sacrificing accuracy, you will want to investigate the Bullard Contin-U-Matic Lathe.

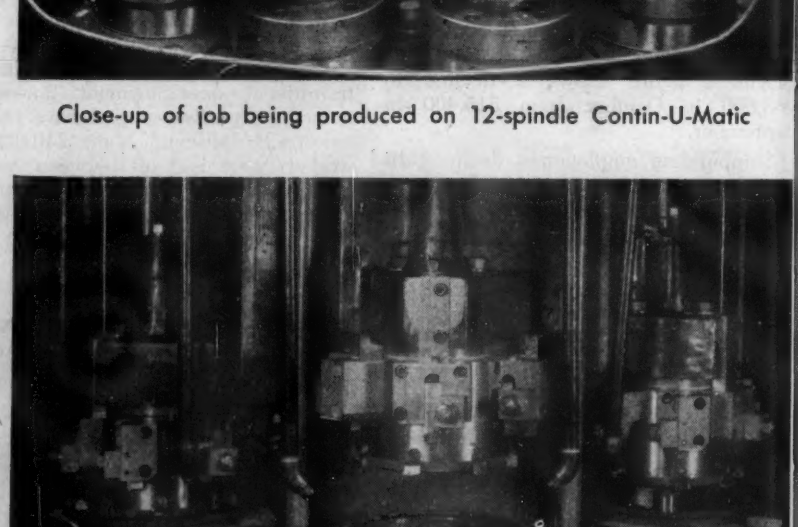
Based on the well-known Bullard vertical construction whereby work continuously rotates about the central column, this machine delivers a finished piece each time one of the six or twelve spindles reaches the loading station.

Because the Contin-U-Matic is tool-engineered for maximum production and loses no time in indexing, it gives you the ultimate in low-cost mass production.

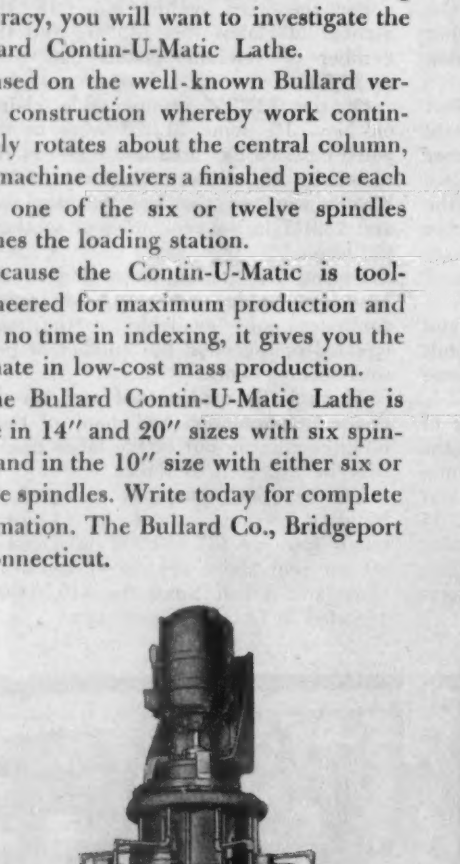
The Bullard Contin-U-Matic Lathe is made in 14" and 20" sizes with six spindles and in the 10" size with either six or twelve spindles. Write today for complete information. The Bullard Co., Bridgeport 2, Connecticut.



Close-up of job being produced on 12-spindle Contin-U-Matic



Close-up of job being produced on 6-spindle Contin-U-Matic



Typical Bullard Contin-U-Matic Lathe

BULLARD

CREATES *NEW METHODS* FOR MAKING MACHINES DO MORE

by A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Union fumbles on General Motors proposal to reopen plants supplying parts for other automakers; UAW president accepts offer, then reneges as local leaders object. Tieup in glass production to hinder automobile output

DETROIT

SOME strange shenanigans are going on inside the three-story brick and stone structure at the corner of Cass and Milwaukee avenues here which the UAW-CIO picked up for a song a few years ago and remodeled into a national headquarters. They may reflect administrative bumbling characteristic of union organizations, or they may spring from more deep-rooted factional cleavages in the top level of union officials.

At any rate, after C. E. Wilson, GM president, had proposed that certain of its parts divisions supplying other automobile manufacturers and now strike-bound be allowed to resume operations, he received an amazingly conciliatory reply signed by R. J. Thomas, UAW president. Mr. Thomas said the offer came as "a welcome surprise," and he would "of course accept the offer," adding "under the circumstances I feel your proposal is a generous one, and as I said it came as a welcome surprise. I do sincerely trust it means a basic change in the thinking of the top management of GM which will bring a more sympathetic approach to the earnings problems of your employees, etc. . . ."

In no time all hell broke loose among the UAW locals which might have been involved in a partial back-to-work movement. A leader of the AC Spark Plug Division in Flint berated Thomas, said his men would not go back to work, since it would only lead to "riots and bloodshed." Seven GM divisions are suppliers of certain requirements of other manufacturers—AC Spark Plug, Delco-Remy, Guide Lamp, Hyatt Roller Bearing, New Departure, Harrison Radiator and Saginaw Malleable.

Thomas Denies Letter

Realizing something was s n a f u, Thomas stalked back to town, hinted he had never written such a letter to Wilson, said nothing came as a "welcome surprise" to him since the union was "at war" with the corporation. Obviously trying to placate the miffed local leaders, he dashed off statements to the press declaring the international union office had no intention of arbitrarily ordering strikers back to work in GM parts plants. Instead, he would look into the "facts" of the case and supply such information to union locals involved so they could make their own decisions. Not satisfied with this, he also whipped off a telegram to the U. S. attorney general asking him to begin an immediate investigation of GM parts production activities with a view to prosecuting the corporation under antitrust laws because of its ownership of the principal source of engine fuel pumps (AC Division).

Meanwhile the union went ahead with a meeting of 15 allegedly "distinguished citizens" to examine the so-called facts (union version, of course) in the GM dispute. Invitations had been declined by Beardsley Ruml, Bernard Baruch, and Rabbi Wise, but an assorted group of bishops, pastors, social workers, professors and "left of center" thinkers, including Leon Henderson, accepted and met here last Tuesday. They were greeted with a 700-page transcript of proceedings in the dispute which the UAW tossed at them. If they can read, digest and pass along any sensible opinion on this mass of wordage in two days, it will be a miracle. Early reports indicated the group might ask Messrs. Wilson and Reuther to address them, but the whole situation was moving to a higher level at midweek, and the "citizens" meeting can be written off as a waste of time.

Further basic reasoning on the entire wage question was contributed by Mr. Wilson of GM in a recent press conference, at which time, incidentally, he predicted the strike would be settled for something less than the last corporation offer of a 10 per cent wage boost. In respect to wages he said: "Our payrolls aren't as big as the amount of money we pay to our suppliers for their materials, and there is no reason to think that auto workers should get a preferred position of 30 per cent against other workers in the country. Our wages are regularly higher than the average of the country, but they start in a relation with the others, and our experience over the years is that when there is an increase in the price level of the country, the wage-price level, it goes through the whole structure of the nation.

"The assumption is that only 30 per cent of our cost is wages. If we had been making a 10 per cent profit and only a third of our cost was in wages, then if we paid the 30 per cent increase demanded, the 10 per cent would be all gone. That is a simple calculation. Apparently then we would be breaking even, but this would not be true because all of our other expenses would go up as well; our outside purchases take over 50 per cent of our income, so that we have to treat everybody fairly. We cannot expect suppliers to produce without a reasonable price. In fact, we are having a very good bit of trouble over that now."

Insistent demands of the UAW that it "see the books" of the corporation are being echoed by many commentators

STRATOCRUISER: Interior of 80-passenger Boeing Stratocruiser-type clipper, 20 of which have been ordered by Pan American. The ships have a cruising speed of 340 miles an hour and a 4200-mile operating range. The New York-London flight will take 11½ hours. NEA photo

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

as if it were a simple thing for GM to bring out a ledger and place it on the table to show quickly why it could or could not pay the wage increase asked. Actually the books of the General Motors and all of its divisions, if they ever could be brought together in one place, would fill several rooms, and would constitute nothing more than a record of past years. They would not show what is being planned for 1946 particularly, or what will be achieved in 1946. In fact, it would be necessary to go back five years to the records of 1941 to get any comparison with what may be in store for 1946. Production during war years was something else again.

Basically, what the UAW is contriving is another major push toward socialized management of industry, not just a 30 per cent hike in their members' wages. They know this is impossible and have known it from the start, but with the aid of government which has coddled labor unions as if they were underdogs from 1933 forward they are attempting to put industrial management on the spot by recriminations and invective and by building up an entirely imaginary picture of what the future holds.

Even though General Motors plants all should resume operations this week, final assemblies of cars would end abruptly because of a shortage of glass. Both principal suppliers, Libbey-Owens-Ford and Pittsburgh Plate Glass, have been strikebound for weeks and glass stocks of the entire automobile industry are near the vanishing point. Ford reportedly is producing part of his requirements in Minneapolis, but all the rest are dependent upon these two suppliers. And it is not only glass, but dozens of other components which likewise are slowed, stopped or otherwise gummed up and would force suspension of automobile output summarily.

Two things seem vital at this moment, and there is only a sputtering chance either of them will be realized: 1. Establishment of a definite pattern for wage-price agreement, interim or otherwise, on the basis of which all manufacturers, large and small, can negotiate differences with unions which have led to work stoppages; 2. recognition by union members and leaders that law and order finally must prevail, even if a few heads have to be cracked to make this clear.

Dominated by Union

As everyone suspected would happen sooner or later, the rights of returned war veterans became injected into the strike picture. A small group of veterans in Flint hinted they might like to go back to work to make some money. Immediately they were snowed under by an overwhelming group of veterans who were union members and who under direction of union officers adopted the usual statements reflecting union demands as indicative of the position of "veterans."

Next, another group of veterans directed protests to the Michigan Unemployment Compensation Commission, declaring the GI Bill of Rights guaranteed them compensation even if the plants where they worked were closed by strike. Unfortunately, the state compensation act reads that, veterans or no, employees made idle directly by strikes in plants where they are employed, are not entitled to compensation.

One interpretation of the President's Monday message to Congress on the labor situation was that he actually got the UAW-CIO "off the hook" because their case was slowly becoming hopeless and they could never ask their striking members to return to work. With the President ordering strikers to return to their jobs immediately, the responsibility would be lifted from the shoulders of union officials. Logical though this reasoning sounds, actually as most people know, union members are never of a mind to pay much attention to any official remonstrations, whether they come from the President, a judge, a police officer or even from their own leaders.

Turning to less inflammatory matters, some observers of trends in the automotive industry profess to see in the accelerated decentralization of manufacturing units of motordom a tendency to move closer to sources of supply of materials—steel, for example. Suggested reason for this shift is the rumored possibility of major changes in steel pricing methods which would place all prices on the basis of f.o.b. producing mill. If Detroit were the locale of all manufacturing on this basis, many steel mills could not absorb the freight involved in shipping into this area, in competition with nearby mills.

This could result in several important basic changes in the supply picture. Thus, local mills, Great Lakes Steel for example, would find their automotive markets tremendously enlarged and might have to make appreciable increases in capacity. There is even some discussion of such probabilities at the moment. The alternative would be to move manufacturing units closer to, say, the Pittsburgh, Chicago and Buffalo areas, where freight charges on steel requirements would be less.

One characteristic of body design which you can look for as almost a certainty in many 1947 models is the complete elimination of front and rear fenders as such, with the body itself being widened and extended to "absorb" fenders. Appearancewise, the effect is to make the car look more rectangular, even bordering on bus design, but it should provide more room.

WEAR-TEST MACHINE: William Day, chief metallurgist of Mack Trucks Inc., New York, explains function of a wear-test machine to a group at Mack's first sales institute since the war started

Private Schools May Now Buy Surplus Planes, Parts

Private aviation technical schools may now obtain surplus aircraft and parts for instructional purposes at a fair value to the government and themselves, it was announced last week. Although tax supported schools have been able for some time to obtain surplus aircraft and components at scrap value, ability to obtain such instructional aids at fair value has not been available to private schools.

THIS VERSATILITY

Also Has Many *POSTWAR USES*

The myriad requirements of war demonstrated the amazing versatility of Vickers Hydraulic Controls. There were so many kinds of jobs to do—jobs which had to be done better than ever before—jobs which had never previously been accomplished.

For example, in this illustration, the plane has Vickers Hydraulic Control for brakes, automatic pilot and cargo door operation. The lift trucks have Vickers Hydraulic Control which lifts and positions the load accurately at the finger-touch of the operator. The graders building air fields use Vickers Hydraulic Power for steering front and rear wheels, raising, lowering or side shifting the blade, and operating the attachments.

These are just a few of the war jobs Vickers Hydraulics have done. Others include the precision movement of heavy battleship turrets—the automatic aiming of anti-aircraft guns—the fast precision positioning of ammunition hoists—the control of bomber gun turrets—and others which, cannot yet be described.

VICKERS HYDROMOTIVE EQUIPMENT

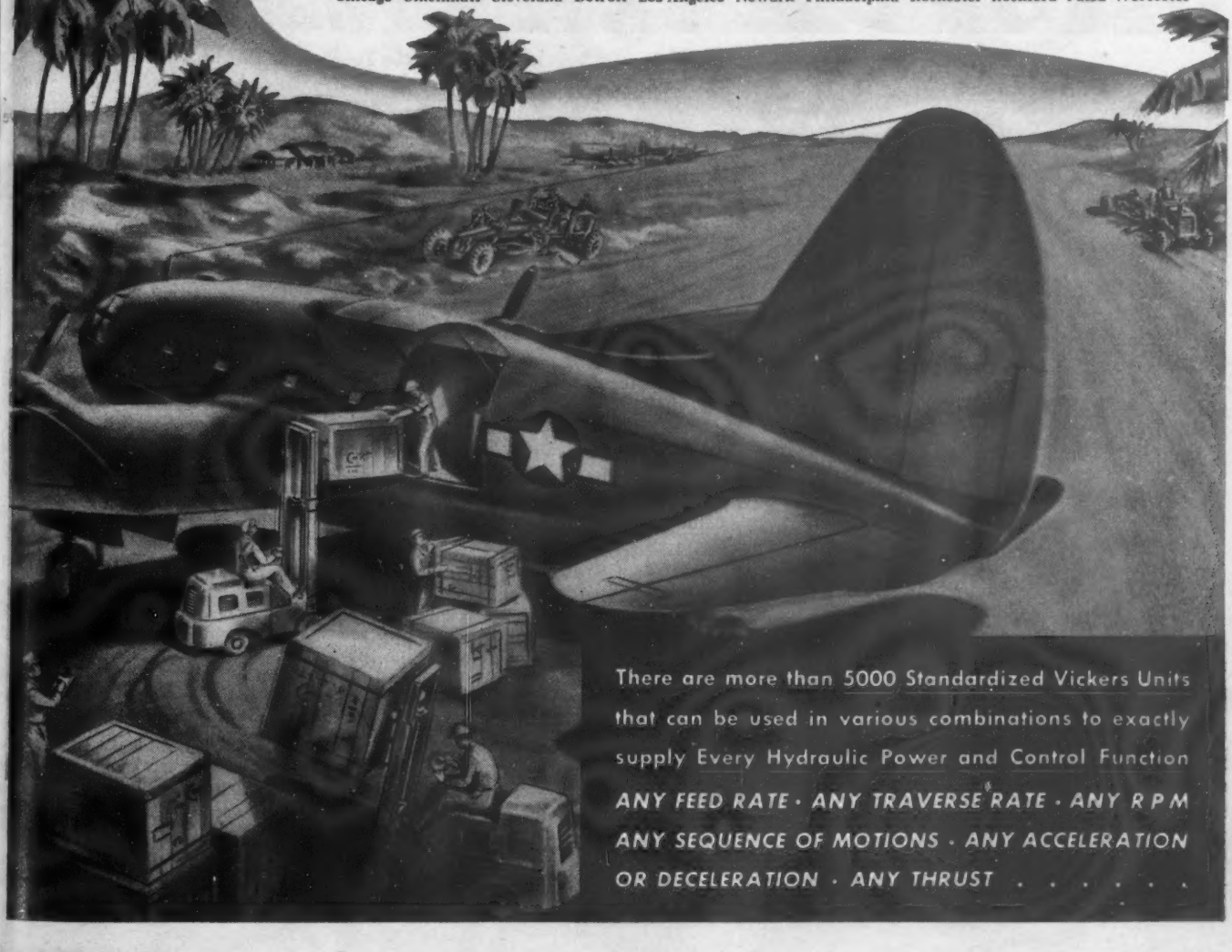
Many of the intricate machine tools that produced the machines that won the war depended for their accuracy, production speed, and ease of operation upon Vickers Hydraulic Controls.

This demonstration of the remarkable versatility of Vickers Hydraulic Controls suggests many new applications to a wide variety of postwar equipment.

VICKERS *Incorporated* • 1480 OAKMAN BLVD • DETROIT 32, MICH.

Application Engineering Offices:

Chicago • Cincinnati • Cleveland • Detroit • Los Angeles • Newark • Philadelphia • Rochester • Rockford • Tulsa • Worcester



There are more than 5000 Standardized Vickers Units that can be used in various combinations to exactly supply Every Hydraulic Power and Control Function

ANY FEED RATE · ANY TRAVERSE RATE · ANY R P M

ANY SEQUENCE OF MOTIONS · ANY ACCELERATION OR DECELERATION · ANY THRUST . . . . . .

Carnegie-Illinois Steel Corp.'s Ohio Works, largest steel mill in the Youngstown district

Mahoning Valley Strives To Hold It Ste

District steelmakers confident they can retain large share of steel business despite disadvantages in costs. Mills and facilities being improved and expanded. Look to Lake Erie-Ohio River waterway to provide relief in transportation costs

YOUNGSTOWN, fourth largest steel producing district in the country, is making aggressive plans to hold its place in the steel world, despite certain cost disadvantages.

"The Ruhr of America," as the area is sometimes known, is as alive and bustling and humming as busily as ever. Its big steel plants are loaded heavily with steel orders, assuring good operations for months to come. The steel plants are spending money for improvements and expansions—and they'll probably begin spending even more, once national labor and tax policies are settled so that they can count on making a little money. They're in business to stay.

"I feel pretty confident," commented the top executive of one large company, "that there will be a considerable volume of steel business for years to come after this war—three, four, five years, who knows how long—and I feel pretty sure that the Youngstown district plants are going to get their share of it.

"If I'm wrong . . . . well, then I've made a $125 million mistake. That's what we have gambled on improvements and expansions based on Youngstown's ability to continue in the steel business."

Youngstown prides itself on being "the steeliest steel district" in that it probably makes more tons of steel per capita, more tons of ingots per square mile of area each year than does any other steelmaking district.

The Pittsburgh, Chicago and Eastern districts produce more steel—but these have their plants scattered over a much wider area; each has a much greater metropolitan population, with a smaller percentage of the total working force directly employed in the iron and steel industry than does the Youngstown district.

Virtually all of Youngstown's iron and steel capacity is clustered on the banks of the Mahoning river—although one steel plant and a few blast furnaces are in the Shenango valley. None is over 16 miles from Youngstown's Central Square. Virtually the entire working force of Youngstown and surrounding communities is directly employed in the iron or steel plants or the steel fabricating plants.

Currently the district has an annual rated steel capacity of 9,827,160 net tons of ingots, or 10.24 per cent of the national capacity of 95,948,030 net tons; it has blast furnace capacity of 7,561,600 net tons, or 10.73 per cent of the national blast furnace capacity of 70,441,600 net tons; and it has by-product coke capacity of 3,665,289 tons, or 6.5 per cent of the national coke capacity of 56,329,683 tons.

It has eight steel plants, with a total of 83 open hearths, six bessemer converters, and 21 blast furnaces; besides

Campbell Works of Youngstown Sheet & Tube Co., one of the Valley's major steel mills

It's Steelmaking Position

By GEORGE R. REISS
Editorial Correspondent, STEEL

there are four other blast furnaces in the district.

Here is the rated steel capacity of the eight plants:

Open Hearths

	Units	Rated Capacity (net tons)
Youngstown Sheet & Tube		
Campbell Works	12	1,212,000
Brier Hill	12	1,104,000
Total	24	2,316,000
Carnegie-Illinois		
Ohio Works	15	1,499,800
Farrell Works	15	1,050,000
Total	30	2,549,800
Republic Steel		
Youngstown Works	15	1,330,000
Warren Works	8	950,000
Total	23	2,280,000
Sharon Steel		
Lowellville Works	6	600,000
Total Open Hearth	83	7,745,800

Bessemers

	Units	Rated Capacity (net tons)
Youngstown Sheet & Tube		
Campbell Works	2	240,000
Republic Steel		
Youngstown Works	2	700,000
Carnegie-Illinois		
Ohio Works	2	784,000
Total Bessemer	6	1,724,000

Electric Furnaces

	Units	Rated Capacity (net tons)
Sharon Steel		
Lowellville Works	1	36,000
Copperweld Steel		
Warren Works	9	321,360
Total Electric	10	357,360
Total district		9,827,160

A major change is being made in the line-up, however, as Carnegie-Illinois turns over its Farrell Works, lock, stock and barrel, to Sharon Steel Corp., Dec. 15, and concentrates all its Youngstown district operations at the Ohio Works, the Union and McDonald mills.

The Farrell iron and steel plant is located next door to Sharon Steel's big finishing mills; the Farrell steel plant will supply semifinished steel for Sharon's own finishing mills, also for its subsidiary, the Niles Rolling Mill Co., and its Detroit tube-making subsidiary. That will save Sharon Steel at least $250,000 in freight charges for transporting semifinished steel 26 rail miles from the Lowellville plant.

Sharon plans to make a couple of immediate improvements at the Farrell Works, chief of which will be installing two 30-ton electric furnaces, more than doubling its present electric furnace capacity.

As to the Lowellville works, the company will dispose of that plant by Jan. 1—although disposal plans still are somewhat indefinite.

One of the Youngstown steel industry's major problems is the proposed Lake Erie-Ohio River waterway; the district contends that that project will not only benefit Youngstown but also will greatly benefit steel plants in the Pittsburgh district and the Ohio River district, also coal users along the Great Lakes by giving them cheaper coal freight rates.

Steel plants contend it costs $2 to $5 per ton of steel more to produce in the Youngstown district than in other districts where the federal government has provided cheap water transportation.

That's because of the higher assembly

costs for raw materials, moving all-rail; Youngstown currently pays $1.44 per ton for much of the coal its steel industry uses, about $1.25 a ton for much of the rest. However, an Interstate Commerce Commission decision recently reduced these rates from seven to 12 cents per ton.

Youngstown proposes to have the federal government build a canal between Beaver, Pa., on the Ohio river, and a point near Ashtabula on Lake Erie; this 102-mile waterway would use the Beaver and Mahoning rivers to Warren, O., and use the enormous Grand river reservoir in Trumbull and Ashtabula counties, O., for much of the rest of the route.

Thus coal could move all-water from western Pennsylvania coal mines to Youngstown; ore would move all water from Lake Superior mines, transferring into barges at Lake Erie ports. And finished steel could move to market by barge from Youngstown.

Youngstown hopes to enlist support in the project from Pittsburgh and Chicago steel mills, from western Pennsylvania coal operators. It points out Pittsburgh could clip its iron ore costs sharply by shipping by barge from Lake Erie; also could move finished products to Detroit and other markets more cheaply. Freight rates on Pennsylvania coal destined to Chicago and the Northwest could move cheaper all-water to Lake Erie ports for loading into lake vessels.

Youngstown steel plants have had a magnificent postwar headache—the strikes in other industries. Plants were hard hit by shortages of oil and coal, resulting from the strikes—and have lost production of at least a few hundred thousand tons of ingots as a result.

The manpower shortage is another real worry.

During the war, at least 10,000 women workers took jobs in the steel plants, replacing men who went into military service; now women are being displaced in the steel plants by state laws—and the steel plants need at least 2000 to 2500 able-bodied male workers. The 40-hour work week here is nowhere in sight—not until there's a more plentiful supply of male workers for steel.

One Youngstown steel fabricating plant wound up its war contracts the other day, shutting down 40 per cent of its plant. It laid off the force working in the war departments. The rest of the plant was short-handed, so it offered jobs to many of the laid-off workers—but few accepted.

"I could use 150 more men today—if I could find them," commented the plant manager.

Hot-Rolled Carbon Steel Bar Standard Proposed

National Bureau of Standards, Washington, has proposed a simplified practice recommendation for hot-rolled carbon steel bars and bar-size shapes. Purpose of this program is to direct the attention of all concerned to those nominal sizes of these items that are in general use and are regarded as affording an adequate selection of sections for ordinary uses and for stocks. The program also aims to make possible reductions in inventories and to contribute to increased production through less frequent roll-changes in the mills through more continuous rolling schedules.

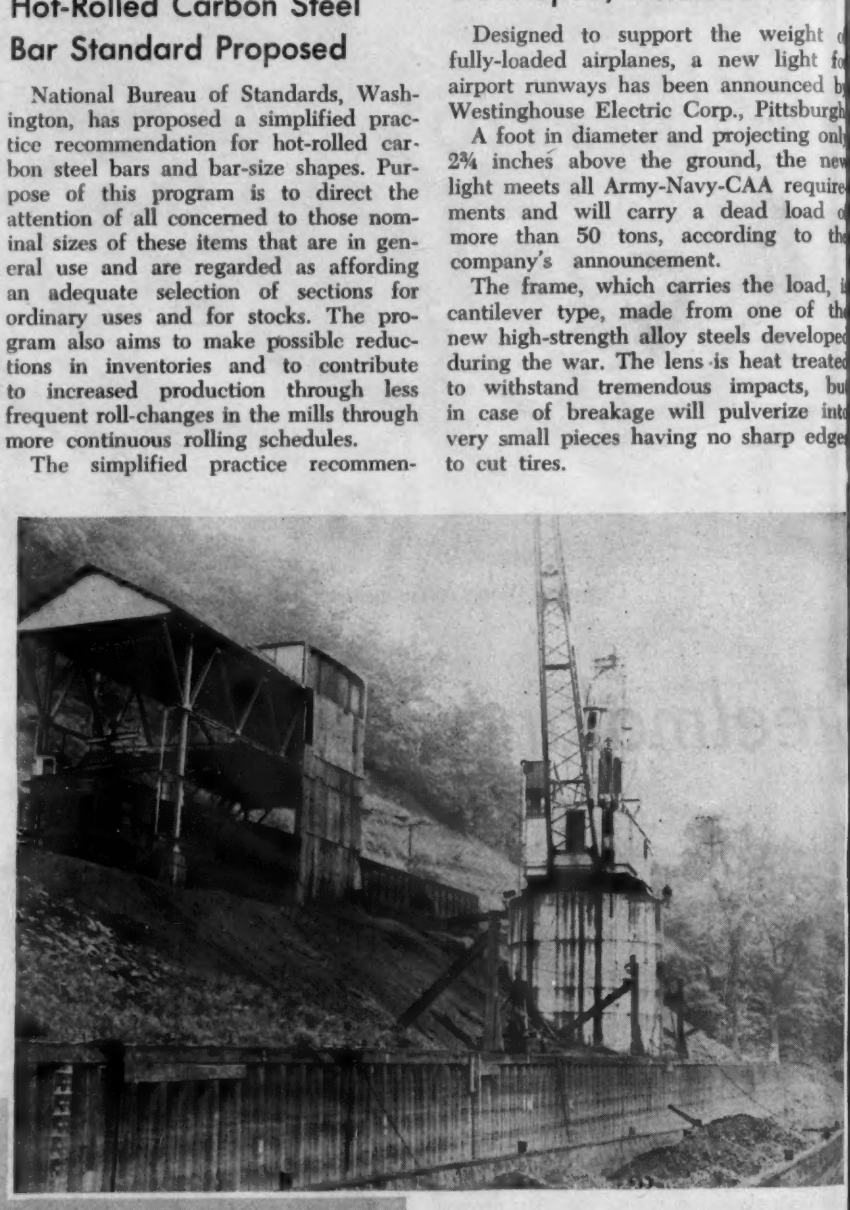
The simplified practice recommendation covers: Bar sections: Rounds, squares, round-corner squares, half-rounds, ovals, and half-ovals (flat bars of all types will be included in a supplementary proposal); Bar-size shapes: Angles, channels, tees. A structural shape is classified as of "bar-size" when its greatest cross-sectional dimension is less than 3 inches.

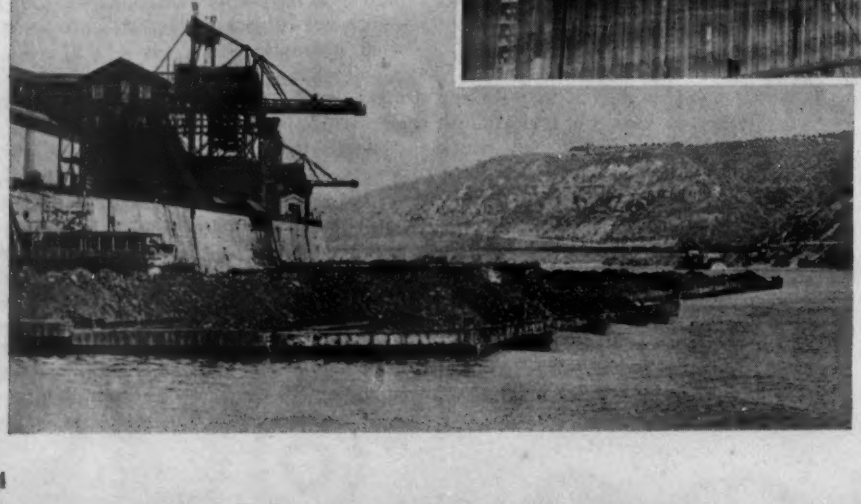
New Airport Runway Light Developed; Holds 50 Tons

Designed to support the weight of fully-loaded airplanes, a new light for airport runways has been announced by Westinghouse Electric Corp., Pittsburgh.

A foot in diameter and projecting only 2¾ inches above the ground, the new light meets all Army-Navy-CAA requirements and will carry a dead load of more than 50 tons, according to the company's announcement.

The frame, which carries the load, is cantilever type, made from one of the new high-strength alloy steels developed during the war. The lens is heat treated to withstand tremendous impacts, but in case of breakage will pulverize into very small pieces having no sharp edges to cut tires.





Assembling of raw materials is a prime factor in steelmaking. Now high in the Youngstown district, it would be lowered by the proposed Lake Erie-Ohio river waterway. Above is a coal lifting plant which transfers coal from river barges to rail cars at Smith's Ferry, Pa., for shipment to Youngstown. At left, barges of coal destined for Youngstown mills by river and rail shipment

Termination of War Contracts Being Speeded

October settlements cut total contracts remaining to be settled to 84,400 valued at $36.6 billion. Plants cleared rapidly

OVER 27,000 terminated war contracts representing $1.5 billion in canceled commitments were settled by government contracting agencies during October, Robert H. Hinckley, director, Office of Contract Settlement, reported last week. These October settlements reduced the number of terminated contracts still to be settled to 84,400 and the value of canceled commitments to $36.6 billion.

Plants were being cleared rapidly during October in the face of a volume of plant clearance requests three times greater than last July, OCS Director Hinckley reported. During October over 25,000 requests for the removal of termination inventories were received. Requests for the removal of government-owned plant equipment numbered 2500. Of the 17,200 requests completed during October more than 65 per cent were completed in less than 40 days and less than 6 per cent required over 60 days.

During October the War Department settled over 19,000 terminations with a canceled commitment value of $1 billion and the Navy Department 5000 contracts with canceled commitments amounting to $391 million.

At the end of October the War Department had received claims from contractors on 10,558 of the 46,000 fixed-price terminated contracts pending settlement, and the Navy had received 2737 claims from contractors on a total of 30,500 fixed-price cancellations still pending settlement.

Machine Tool Sales Remain Constant, Survey Shows

The up-turn in machine tool sales, to permit full postwar production, will not take place at least until next Spring, according to a survey conducted among 50 field representatives from all sections of the United States recently for the annual sales meeting of the Warner & Swasey Co., Cleveland.

With surprisingly little variation, the sale of new machine tools over the entire country during the first quarter of 1946 is expected to remain at about the same level as it has during the past three months.

There is, however, a rising trend—as definite in West Coast industry and throughout the South as it is from Detroit eastward—toward replacement of present obsolete equipment with new types of machine tools now being introduced.

Strikes and demands for higher wages, coupled with the ceiling on prices, are holding back the signing of actual orders for new equipment by West Coast, New England and East Coast manufacturers, pending clarification of the labor-OPA situation.

According to this Warner & Swasey survey the acquisition of government surplus machine tools shows up as a stop-gap measure in a degree corresponding to the above reactions on the labor-OPA situation. About 60 to 70 per cent of machine tools purchased in industries of the East and West Coasts, and around Detroit, fall in this category. The South is splitting its orders between surplus equipment and tools of new design, while midwestern manufacturers and those in the "industrial triangle" range downward to a narrow margin of acceptance for government surplus.

Throughout the country, the low price and early delivery of machines from government inventories are the major factors of consideration.

Die Shop Group Holds Red Tape Stalls Tool Buying

Protesting against "artificial and needless scarcity" of machine tools caused by the methods of the government agencies responsible for the sale of surplus property, the Cleveland Tool, Die & Machine Shop Association last week sent a resolution to the National Tool & Die Manufacturers Association urging immediate action to remedy the situation.

The resolution of the association representing 49 tool, die and machine shops in the Cleveland area stated:

"It appears that this surplus equipment is not readily available for sale to private industry, at least through the surplus property division of the Cleveland office of the RFC."

The charge was made that many Cleveland manufacturers have had to send representatives to Chicago where they have been able to purchase government surplus property much more quickly than through the Cleveland regional office of the Reconstruction Finance Corp., and it was stated that other companies in the area have bought the urgently needed equipment from "sales agencies" which have charged "unreasonably high prices."

"It is apparent," the resolution asserted, "that there is something radically wrong with the way this disposal of government surplus machinery and equipment is being handled. Possibly the major trouble is that other government agencies are negligent in getting clearances through to RFC."

Accompanying the resolution to the national association was the following statement:

"Members of the Cleveland Tool, Die & Machine Shop Association are becoming very dissatisfied and impatient with the way surplus material and equipment is being disposed of and urge that all steps possible be taken * * * to clear up this regrettable situation immediately by suggesting the elimination of existing red tape and confusion apparently involved in the disposal of surplus equipment and materials through government agencies."

The resolution, addressed to George S. Eaton, executive secretary of the national association, was signed by R. H. Cope, Cleveland association president.

READY FOR LAST SACRIFICE: Japanese kamikaze planes are piled high at Sasebo, Japan, preparatory to burning. Shortly after this picture was taken the suicide craft were ignited by a flame throwing torch from the tank in foreground and went up in flames. NEA photo

MEN of INDUSTRY

J. T. PARSONS

CHARLES E. HOWES

CLARENCE H. SAMPLE

J. T. Parsons has been appointed district manager, Pittsburgh branch, Peninsular Grinding Wheel Co., Detroit. For the past 10 years Mr. Parsons has been associated with Carnegie-Illinois Steel Corp., Pittsburgh, as a sales representative in its Cleveland district.

—o—

John D. Dale has been elected president of the metal and chemical firm, Charles Hardy Inc., and its associated research organization, Hardy Metallurgical Co., both of New York. Mr. Dale, who had been vice president and director of Charles Hardy Inc., and a director of Hardy Metallurgical Co. since 1940, recently has been released from active duty with the Army. He succeeds the late **Charles Hardy.**

—o—

Edward M. Whiting recently was elected president, Pheoll Mfg. Co., Chicago.

—o—

R. C. Alley has been appointed manager of the newly formed Alco-GE Diesel-Electric Locomotive Division, Apparatus Department, General Electric Co. at Erie, Pa. **T. F. Perkinson** has been appointed manager, Railroad Rolling Stock Division, also of Erie, Pa.

—o—

Maj. Milton Levenson, who has been assistant director of materials, in charge of ferrous and nonferrous scrap, Surplus Property Administration, has resigned and has become associated with Erman-Howell & Co. Inc., Chicago.

—o—

Raymond Koontz, vice president, Maguire Industries Inc., Bridgeport, Conn., has been named general manager of all the company's operating divisions. Connected with the company since 1936, Mr. Koontz previously was in charge of the ordnance and electronics operations of the company.

—o—

Dr. Walter C. Rueckel, general superintendent of operations, Koppers Co. Inc., Engineering & Construction Division, has been appointed New York district sales manager of the division. **Elliott Preston** has been appointed general superintendent of operations to succeed Dr. Rueckel.

—o—

Charles E. Howes has been appointed assistant manager of sales, Steel Equipment Division of the Berger Mfg. Division, Canton, O., Republic Steel Corp. Mr. Howes has been with the Berger division for 20 years and since 1936 has served as manager of kitchen cabinet sales.

—o—

Maj. Maxwell A. Goodwin has returned from three years' service in the Army to his former position as Chicago division manager, Clark Tructractor Division, Clark Equipment Co., Buchanan, Mich.

—o—

Thomas B. Morris has been appointed vice president, United Steel Fabricators Inc., Wooster, O.

—o—

R. N. Green has returned from two years' military service to resume his post as president and general manager, Pilgrim Products Corp., Plymouth, Mich. **R. E. Lawlor,** Fisher Bldg., Detroit, who has been acting general manager, continues as vice president in charge of sales.

—o—

F. A. Jackle has been elected a vice president, Chase Brass & Copper Co., Waterbury, Conn. **Walter L. Smith** has been appointed to succeed Mr. Jackle as general works manager.

—o—

R. E. Bloye, formerly assistant manager of manufacturing, Industrial Power Division, International Harvester Co., Chicago, has been appointed works manager of the newly established Melrose Park works following acquisition by the company of the plant in Melrose Park, Ill., which was operated during the war by Buick Aviation Engine Division, General Motors Corp. **Dante Chimenti,** formerly assistant general superintendent and **Brooks McCormick,** formerly special engineer, Tractor works, Chicago, have been made general superintendent and assistant general superintendent, respectively. Melrose Park works. **Peter A. Becker,** formerly general foreman, Tractor works, has been advanced to assistant general superintendent there.

—o—

Clarence H. Sample, formerly a member of the technical staff, Bell Telephone Laboratories, has joined Rheem Research Products Inc., Baltimore, as chief engineer.

—o—

Donald L. Schwartz has joined Carboloy Co. Inc., Detroit, as research metallurgist. Mr. Schwartz, who was superintendent of the metallurgical laboratory, Cleveland Graphite Bronze Co., Cleveland, left that company in 1943 to undertake war research work at the metallurgical laboratory of the University of Chicago.

—o—

Harry A. Dennis recently was named sales representative in Erie, Pa., and vicinity for Lukens Steel Co., its subsidiaries, By-Products Steel Corp., and Lukenweld Inc., Coatesville, Pa.

—o—

Ray F. Waltemade has been appointed works manager, Rudolph Wurlitzer Co. at North Tonawanda, N. Y., and will assume general direction of all manufacturing activities of the factory. **Charles H. Parker,** formerly superintendent of metalworking departments, has been promoted to assistant to the general manager.

—o—

Charles M. Wiseman Sr., Wiseman Engineering Co., Monroe, Mich., has been appointed production engineer in charge of manufacturing and engineering, Hampshire Products Inc., Milan, Mich.

—o—

S. M. Jenks, general superintendent of the Gary, Ind., plant, Carnegie-Illinois Steel Corp., Pittsburgh, was elected second vice president and **C. Harvey Bradley,** W. J. Holliday & Co., In-

MODERN HANDLING METHODS

Now a Must!

There's no time to lose in getting operating costs on a competitive peace-time basis. Modern methods of handling are now a *must.* Electric industrial trucks, for example! Palletized loads! And, of course, the newest development in motive power Storage Batteries . . . the sensational Philco "Thirty" that gives 30% longer life! Try Philco "Thirty" in your hardest-working trucks. The tougher the job the better it shows up. Write for the facts today.

● The new Philco "Thirty" Industrial Truck Storage Battery, that gives 30% longer life, is identified by its distinctive red connectors.

PHILCO

Famous for Quality the World Over

FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

Tune in The Radio Hall of Fame, with Paul Whiteman and His Orchestra, Sundays, 6 P.M., EST; The Breakfast Club with Don McNeill, 9:45 A.M., EST, Monday through Friday—ABC (Blue) Network.

PHILCO CORPORATION · STORAGE BATTERY DIVISION · TRENTON 7, NEW JERSEY

RICHARD A. STORM

NATHANIEL WARSHAW

HARRY E. CONRAD

dianapolis, was named third vice president, Indiana State Chamber of Commerce.

—o—

Richard A. Storm, recently released from active duty by the Navy, has been made director of the Manpower Utilization Division, Tennessee Coal, Iron & Railroad Co., Birmingham. He joined the company in 1937 as a stenographer in the construction department, Fairfield steelworks.

—o—

Arthur A. Ladwig has been appointed vice president in charge of manufacturing and **John M. Dolan,** vice president in charge of sales, LeRoi Co., Milwaukee. Mr. Ladwig has been factory superintendent for the past nine years and Mr. Dolan, general sales manager since 1943.

—o—

W. H. Steele has been named director of purchases, Bendix Home Appliances Corp., South Bend, Ind. For approximately 16 years Mr. Steele was with Caterpillar Tractor Co., Peoria, Ill., serving as buyer, assistant purchasing agent and purchasing agent.

—o—

Associated Industries of Alabama, Birmingham, has named the following to its board of directors for the new year: **Maurice I. Bloch,** president, Selma Foundry & Machine Co., Selma, Ala.; **Henry T. DeBardeleben,** president, DeBardeleben Coal Corp., Birmingham; **John W. Porter,** president, Alabama By-Products Corp., Birmingham; **C. Pratt Rather,** president, Southern Natural Gas Co., Birmingham.

—o—

John C. Fairchild has been appointed advertising manager, Ajax Electric Co. Inc., Philadelphia, having returned from five years' service with the twenty-eighth infantry division.

—o—

C. J. Bickler has been appointed manager of sales at Los Angeles for the Globe Steel Tubes Co., Milwaukee. Mr. Bickler has served as assistant to the vice president in charge of sales for three years. He has also been in charge of the company's Welded Tube Division and served as manager of sales in the company's Cleveland office.

—o—

Nathaniel Warshaw, consulting engineer in materials handling, now heads the Materials Handling Division, Market Forge Co., Everett, Mass. In the past he has served as president and chief engineer, Service Caster & Truck Co., and as chief engineer, Lewis-Shepard Products Inc.

—o—

T. Albert Potter, president, Elgin National Watch Co., Elgin, Ill., has been nominated for president, Illinois Manufacturers Association. Election will take place at the association's annual dinner meeting Dec. 11 at the Stevens Hotel, Chicago.

—o—

H. M. Munson has been appointed manager of the newly organized Industrial Instruments Division, Claud S. Gordon Co., Chicago. Mr. Munson formerly was associated with Manning, Maxwell & Moore Inc., Bridgeport, Conn.

—o—

James Birnie Jr. has been appointed art director, Foil Division, Reynolds Metals Co., Richmond, Va. **Frank Condon** has been appointed assistant to Mr. Birnie. Other members of the staff include: **Kermit Cavedo, Harold Johnson, Peggy Morrison, Ruth Groomes, John Stengel, Doris Sutton, Harold Kimmelman, W. H. Lipscomb Jr.** and **Gilbert Schmid.**

—o—

Westinghouse Electric Corp., Pittsburgh, announces the following appointments: In the welding department, motor division, **Charles H. Jennings** becomes engineering manager; **John H. Blankenbuehler,** manager, arc welding apparatus; **E. Hill Turnock Jr.,** manager arc welding electrodes. **Norman S. Kornetz** has been named project engineer in charge of Westinghouse television receiver development. **Robert A. Bozeman** has been named district stores manager, southwest district, Westinghouse Electric Supply Co., with headquarters in Atlanta. Order of Merit, highest honor of the corporation, has been presented to **Edmund N. Bowles,** northern district apparatus sales manager, Westinghouse Electric Supply Co., Milwaukee.

—o—

Harry E. Conrad has been appointed executive secretary, American Society of Tool Engineers, Detroit. Mr. Conrad has served as district manager, Pontiac Motor Division, General Motors Corp. at Buffalo; manager, War Products Division, Automotive Council for War Production; and manager, Central Aircraft Council.

—o—

James Donnelly, formerly sales manager, gas water heaters, has been appointed product supervisor of the Water Heater Division, A. O. Smith Corp., Milwaukee, succeeding **J. E. Woodall** who is resigning because of ill health.

—o—

Ernest Spuhler has been named general sales manager, Fairmount Tool & Forging Co., Cleveland, manufacturers of hand tools and body and fender repair tools.

—o—

Edgar Kaiser has been elected a member and vice chairman of the board, Kaiser-Frazer Corp., Willow Run, Mich.

—o—

G. S. Myers has been appointed a member of the chemical engineering staff, Eshelman & Potter, combustion and chemical engineers with offices in Birmingham and Charlotte, N. C.

—o—

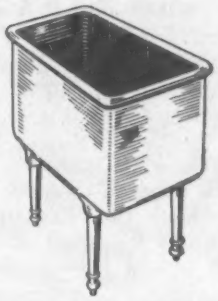
Thomas M. Rodgers has joined Hanson-Van Winkle-Munning Co., Matawan, N. J., and will have his headquarters at Philadelphia. He will work on development and marketing of new processes for the electroplating industry.

—o—

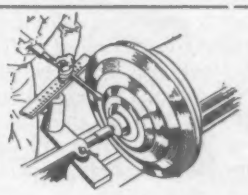
Maj. Albin Dearing, Eccleston, Md., has been named executive head, Packaging Institute, New York. Prior to his

Want a Tip?

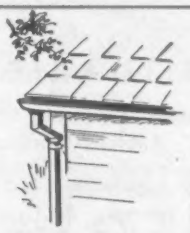
on selecting your most practical Stainless Sheet finish



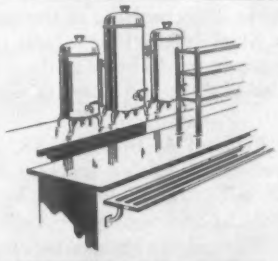
WHITE, PICKLED—No. 1 —for deep draws. Tanks, bins for chemicals—the dough trough shown at the right —heavy duty industrial equipment—applications in which stainless works with its sleeves rolled up.



DULL, SMOOTH—No. 2D —for forming, drawing, dishing —*and spinning.* Mild cold finishing has rendered the surface smooth and dense. Tools ride easily over the surface. Stainless shapes itself to your product— and your needs.



BRIGHT, DIFFUSELY REFLECTIVE—No. 2B —for formed products where "look" is a factor. Painstakingly rolled and inspected for perfect uniformity of surface, 2B calls attention to itself. And where special sheens and lusters are required, 2B can be brushed or polished after fabrication.



POLISHED, SATIN, REFLECTIVE—No. 4 —one of the most dramatic of stainless finishes—and the easiest to keep clean. The finish for food service equipment, decorative trim, dairy equipment — wherever it pays to boast, "This is stainless."

JML Co B-171

EASTERN STAINLESS
STEEL CORPORATION
BALTIMORE 3, MARYLAND • Distributors' stock available in most areas
CHICAGO · CLEVELAND · DALLAS · DETROIT · LOS ANGELES · NEWARK · PHILADELPHIA

ES

STEPHEN A. BROOKS

Who is president of the newly organized Brooks Rotameter Co., Lansdale, Pa., noted in STEEL, Dec. 3 issue, p. 106.

A. J. ROD

Who has recently been appointed district manager at Houston, Tex., Carboloy Co. Inc., Detroit, noted in STEEL, Dec. 3 issue, p. 106.

JOSEPH B. PATTON

Who has been named manager, industrial relations, Oliver Iron & Steel Corp., Pittsburgh, noted in STEEL, Nov. 26 issue, p. 82.

service with the armed forces, Major Dearing was director of public relations, Container Corp. of America, Chicago.

—o—

William P. Witherow, president and **C. H. Lehman,** executive vice president, Blaw-Knox Co., Pittsburgh, have been elected to the board of directors, Blaw-Knox Ltd., a London, England affiliate.

—o—

W. B. Pierce has been named to head a newly organized sales development department for stainless steel and other alloy steel products, Allegheny Ludlum Steel Corp., Brackenridge, Pa. Mr. Pierce served as chief of the Stainless Steel Branch, War Production Board, from January, 1945 until after V-J Day, and has been with Rustless Iron & Steel Corp., Baltimore, as manager of market development. He also has been associated with the Development Division, Aluminum Co. of America at Pittsburgh and New Kensington, Pa.

—o—

William Wiseman has been appointed assistant chief engineer in the Aircraft Division, Continental Motors Corp., Muskegon, Mich. He has been connected with the Warner Aircraft Co. for the past 12 years and at the time of his resignation was that company's chief engineer.

—o—

Fred T. H. Youngman has been elected president of Jessop Steel Co., Washington, Pa., succeeding **R. Edson Emery,** who has been elected chairman of the board. Mr. Youngman had been vice president of the company. **W. C. Buchanan,** president and director, Globe Steel Tubes Co., Milwaukee, was elected a director as were **Andrew J. Dallstream,** a Chicago attorney, and **Linwood A. Miller,** Chicago.

—o—

Ralph E. Kramer recently was elected vice president in charge of sales, Hammond Iron Works, Warren, Pa.

—o—

Frederick S. Blackall Jr., president and treasurer, Taft-Peirce Mfg. Co., Woonsocket, R. I., has been re-elected president, New England Council.

OBITUARIES...

James Henderson, 77, deputy chairman, Appleby-Frodingham Steel Co. Ltd., Scunthorpe, England, and an honorary treasurer of the British Iron and Steel Institute, died recently in London, England. Mr. Henderson was a guest at the 1939 meeting of the American Iron & Steel Institute at which time he read a paper on, "The Manufacture, Sale and Use of Iron and Steel in Great Britain."

—o—

William A. Butchart, 78, inventor and builder of mining machinery, died Nov. 25 in Denver, Colo.

—o—

Edward L. Biersmith Jr., 45, plant manager, Columbian Steel Tank Co., Kansas City, Mo., died Nov. 24. Mr. Biersmith had served as plant manager for the past five years, his previous position being assistant sales manager.

—o—

Clyde C. Farmer, 75, retired engineering director, Westinghouse Air Brake Co., Wilmerding, Pa., died Nov. 28. He joined the company in 1901, and was director of engineering from 1919 until his retirement in 1940. He held patents for more than 500 inventions.

—o—

Maurice A. Banks, 65, founder and president, National Engine Builders & Supply Corp., Buffalo, died recently. Mr. Banks served as president and treasurer of the company 30 years.

—o—

Maurice C. O'Brien, 51, vice president, Material Service Corp., Chicago, died Nov. 28 in Evanston, Ill. He had been associated with the corporation 25 years and as vice president for eight.

—o—

Harry E. Siegmund, 47, assistant to the vice president, Ryan Aeronautical Co., San Diego, Calif., died Nov. 21.

—o—

Thomas H. Sloban, 61, a general superintendent with R. W. Kaltenbach Corp., Cleveland, died recently at Bedford, O. He had been with the company 33 years.

—o—

Hermes V. Smith, 49, assistant purchasing agent, Addressograph-Multigraph Corp., Euclid, O., died Dec. 4 while on a business trip in Chicago. Mr. Smith had been with the company 20 years, serving as assistant purchasing agent 15 years.

—o—

Finley B. Krause, 41, director of production planning, Bendix Aviation Corp., in Norwood, Mass., died Nov. 28 at his home in Medfield, Mass.

—o—

Jacob W. Gerke, 68, sales representative for the Lebanon Steel Foundry, Lebanon, Pa., and Berks Engineering Co., Reading, Pa., died Dec. 1 at his home in Flushing, N. Y.

—o—

Harry G. Fisk, 72, founder of the Fisk Rubber Co., now a division of U. S. Rubber Co., died Nov. 30 at his home in Springfield, Mass.

—o—

Henry R. Hoffman, 81, pioneer foundryman and stove manufacturer who founded the Major Foundry Co., Chicago, more than 50 years ago, died Dec. 3 in that city.

—o—

Winslow Goodwin, 81, export manager, Croname Inc., Chicago, died Dec. 2 in Wilmette, Ill.

Steel Firm To Expand Line of Magnet Steels

Allegheny Ludlum Steel Corp. to acquire Arnold Engineering Co., Chicago, manufacturer of magnets

ALLEGHENY Ludlum Steel Corp., Brackenridge, Pa., will expand its line of magnet steels to include all types of "hard" and "soft" magnets, and magnetic and non-magnetic alloy steels by acquiring the Arnold Engineering Co., Chicago, Jan. 2, 1946. This company is one of the largest manufacturers of permanent magnets, specializing in the Alnico alloys, licensed from General Electric Co., Schenectady, N. Y.

Allegheny Ludlum has been a leading producer of silicon steel and other "soft" magnetic alloys, as well as some of its own "hard" magnetic alloys and others acquired in 1944 under license from the Western Electric Co., New York. The company expects to produce permanent magnets in every practicable shape and in sizes ranging from a fraction of an ounce to 100 pounds. To assist manufacturers and engineers in the highly specialized field of magnet design, Allegheny will expand its engineering service department.

Peacetime Applications Accelerated

Peacetime applications of high strength permanent magnets have been greatly accelerated by widespread wartime experience in using them. Advantages gained in using high strength magnets in preference to magnets of lower remanence and coercive force are improvement in operating performance of equipment, reduction or sometimes avoidance of energizing coils and current, and reduction in size and weight of equipment, which often result in greatly reduced costs. Alnico and other strong magnets are also many times more stable than lower strength magnets under the influence of heat, vibration, stray magnetic fields, and time. As a consequence they are more reliable than a power source for producing a magnetic field.

Although the greatest demand for "hard" permanent magnets will be by manufacturers of electrical and electronic equipment, they have become increasingly useful in non-electrical products such as magnetic chucks, holding devices, clamps, clutches, magnetic separators, coin operated machines, lubricating oil filters, etc.

Allegheny Ludlum will exchange 25,000 shares of its common stock, worth about $1 million at current market prices, for 500 shares of Arnold Engineering Co.'s stock. The new stock is to be issued around Jan. 2, 1946. In addition, Allegheny agrees to give one share of its stock for each $34 recovered by the Arnold company upon claims for a $261,000 refund of excess profits taxes for the years 1942 through 1944.

BRIEFS . . . .

Reynolds Metals Co., New York, has moved its Export Division from Richmond, Va., to Reynolds Metals Bldg., 19 E. 47th St., New York.

—o—

Baker Industrial Truck Division, Baker-Raulang Co., Cleveland, has announced a new 4000 lb. capacity truck which has an articulated frame permitting more efficient warehousing operation.

—o—

Middletown Iron & Steel Division, David J. Joseph Co., Cincinnati, has opened branch offices in the Commerce Bldg., St. Louis, and at 413 Exchange Bldg., Birmingham.

—o—

F. L. Jacobs Co., Danville, Ill., coil spring manufacturer, has opened offices in downtown Danville, pending completion of its $200,000 plant in S. Danville, Ill.

—o—

Bates Expanded Steel Corp., East Chicago, Ind., has been purchased by a new organization which will continue production of the same products.

—o—

King Instrument Co., Cleveland, has been organized for sales and service in the northeast Ohio area of King Engineering Corp.'s products.

—o—

Sterling Alloys Inc., Woburn, Mass., has appointed H. V. Bordeaux, 649 S. Olive St., Los Angeles, representative for California. The company has also opened an office at 4 W. Seventh St., Cincinnati, and has moved its Dayton, O., office to 1315 Mutual Home Bldg., its Chicago office to 333 N. Michigan Ave., and its Portland, Oreg., office to 1869 S. W. Broadway.

—o—

Elwood and Kankakee Ordnance plants, south of Joliet, Ill., have been consolidated and will be held on a standby basis under the name of Joliet arsenal.

—o—

Continental Can Co., New York, has given awards to 204 of its employees in the Chicago area who have been with the company for 25 years.

—o—

Charles T. Brandt Inc., Baltimore, has acquired the Leonhardt Body Corp., that city. The latter firm, to be operated as Leonhardt Body Division, will soon resume the building and repair of truck and trailer bodies. Joseph L. Hagger, former president of the Leonhardt plant, is now a vice president of Charles T. Brandt Inc., in charge of the body division. W. P. Federline is general manager of the division.

—o—

Young & Ward Inc., Hillsboro, O., has been organized by Fred J. Young and Russell J. Ward to manufacture and repair hand and pneumatic chisels.

—o—

Bryant Heater Co., Cleveland, has developed a complete line of gas heating equipment and soon will have available gas-fired water heaters, vented and non-vented wall heaters, portable space heaters and floor furnaces.

Pittsburgh Equitable Meter Co. Is Now Rockwell Mfg. Co.

Change of name of Pittsburgh Equitable Meter Co., Pittsburgh, to Rockwell Mfg. Co. has been approved by stockholders. The change was prompted by the increasing scope of the company's manufacturing facilities and products.

Directors of the Pittsburgh Equitable Meter Co. will continue as directors of the Rockwell Mfg. Co. Col. Willard F. Rockwell, for whom the company is named, is chairman of the board and president. Although the name of the parent company has been changed, the Pittsburgh Equitable Meter Co. name will be continued as a subsidiary to market measuring equipment.

The Rockwell Mfg. Co. is the parent company also of Merco Nordstrom Valve Co., Oakland, Calif.; Rockwell Machine Co., Hopewell, N. J.; Edward Valve & Mfg. Co. Inc., East Chicago, Ind.; Delta Mfg. Co., Milwaukee; V. & O. Press Co., Hudson, N. Y.; Crescent Machine Co., Leetonia, O.; Rockwell International Corp., New York; and Monessen Foundry & Machine Co., Monessen, Pa. More than 4000 people are employed in the various subsidiaries and divisions.

Republic Industries Inc. Buys Geometric Stamping Co.

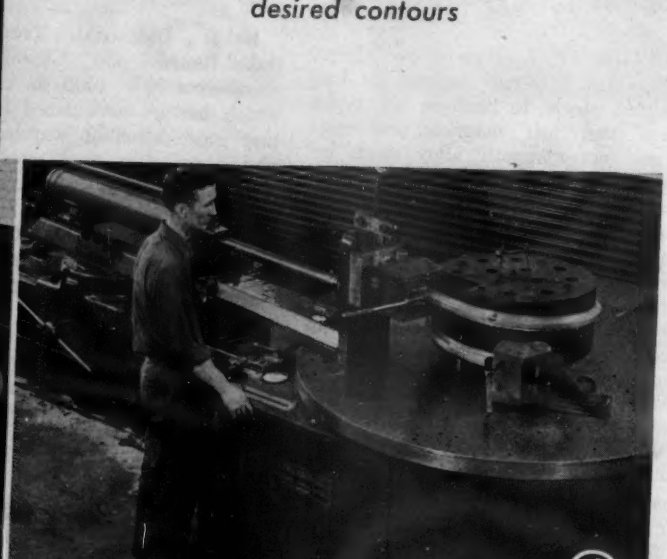
Republic Industries Inc., New York, has acquired controlling interest in Geometric Stamping Co., Cleveland, maker of automatic parts, it was announced last week by R. A. North, executive vice president of Republic. D. R. Jones, president of Geometric, will remain in that capacity and also will become a director of Republic Industries.

This acquisition temporarily completes Republic's diversification plans, which were started early this year to co-ordinate the manufacturing activities of several kindred firms. Those plants which have been taken over are: Porcelain Steel Inc., Cleveland, which will become Porcelain Steels Division at the end of this year; Kermath Mfg. Corp., Detroit, marine engine builder; and Jacobs Aircraft Engine Co., Pottstown, Pa.

COLD METAL

By R. A. MACKENZIE
Design Engineer
Cyril Bath Co.
Cleveland

Modern complexity of fabricating shapes and materials necessitates incorporating wide functional latitudes in bending machines to produce the desired contours



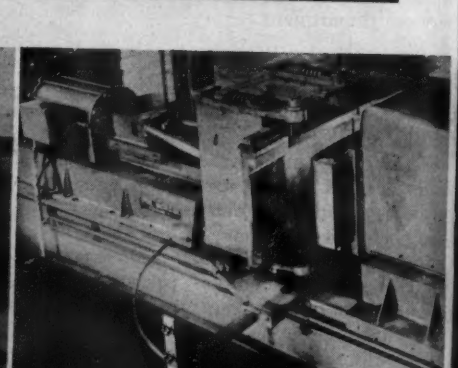


Fig. 1—Completed hat section ring, usually made either of aluminum or stainless

Fig. 2—Compression roll forming of heavy bus bumpers

AL CONTOUR FORMING

"CONTORTIONISTS" of the metal fabrication industry, contour forming machines produce a variety of shapes which cannot be otherwise mechanically shaped. Contours, such as that shown in Fig. 1, can be formed with these machines in the various steel and aluminum alloy sheets and shapes.

Production of heavy bus bumpers by compression roll forming is illustrated in Fig. 2. It is calculated that if this could be done on a press, it would require a 1000-ton machine. However, as the roll forming process overcomes the resistance of the material only in a limited area at a given time, the work is done on a 25-ton contour forming machine, and the cost of dies is much less.

The Cyril Bath Co., 6984 Machinery avenue, Cleveland, has devoted its efforts toward the development of a general purpose bender capable of producing a wide variety of shapes in relatively short runs with consistent tool economy. Constant redesign and improvement has brought out new machines which do in one stroke and at twice the speed what the older machines did in three strokes.

Figs. 3 and 4 illustrate a lighter machine, also made by Cyril Bath Co., being used as a stretch former, producing high alloy stainless or aluminum hat section rings. These rings are held to close tolerances in cross-sectional area and diameter. When cut to size they leave no flat spot at the joint in the finished ring, Fig. 1. The machine used in this operation represents a radical change over the original models made by the company.

In 1929, the company built the first all welded frame steel bulldozer—a sort of "jack-of-all-trades" in the bending business. A typical bulldozer installation was the company's original tangent bender shown in Fig. 8. Here a complex set of cam guided dies were made to produce, in three movements, the crown and flanges, and bend the two sides of a typical domestic refrigerator case. This proved to be the pioneer of a more specialized machine developed in 1939. The later model was known as a tangent bender, shown in Fig. 6, in which the original bulldozer almost got lost in the shuffle. Since then machines of this type have been made for the use of majority of the refrigerator manufacturers in this

(*Please turn to Page* 164)

Figs. 3 & 4—A lighter machine used as a stretch former for the production of hat section rings. Rings can be held to close tolerances whether formed of aluminum or high alloy stainless

Fig. 5—Versatility of machine exemplified by formed shape having irregular curves in two planes. Machine will produce reverse stretch bends and handle rolled, brake formed shapes, extrusions and sheets

Fig. 6—Modification and redesign developed this, the second tangent bender. In this version the original bulldozer got lost in the shuffle

Fig. 7—Present basic machine is know as Universal contour former. It consists of a swiveling hydraulic cylinder and a revolving table

Fig. 8—All welded frame steel machine, called the Bulldozer, was the first tangent bender. It was a sort of "jack-of-all-trades" in the bending business

Checking PISTON RINGS

Automatic gaging machine checks at high speed both gap and periphery for any dimensions desired

FULLY automatic checking of piston rings is provided by a new gaging instrument which has inspected an average of 1500 piston rings, 5¾ in. in diameter, in 1 hr. It should afford greatly reduced inspection costs and higher uniform quality to piston ring manufacturers and makers of automobile, aircraft, diesel and utility engines. Any dimensions desired can be maintained.

In some plants, piston rings still are tediously inspected by hand for proper width of gap and trueness of periphery. Ring is inserted in a master ring and gap is checked with a feeler gage, while trueness of periphery is determined by viewing it over a light source to see if light shows at any point on the edge in contact with the master ring. It is left to the inspector's individual judgment to decide whether a ring is sufficiently light-tight to be acceptable. Setting of a standard is a problem and it is always questionable as to how close the inspector adheres to it. Despite sincerity of purpose, inspector's degree of mental and physical alertness really determines accuracy of check. Hand inspection usually is slow and costly and rings vary, with some that should be rejected passing inspection.

With the automatic piston ring inspector, made by Sheffield Corp., Dayton, O., 100 per cent inspection of cap and periphery is much more accurate and far less expensive than sample checking by hand. Uniform quality of accepted parts is assured. Salvageable rings are positively classified so that rework costs are lowered. Rejected rings are definitely known to be below acceptable standards.

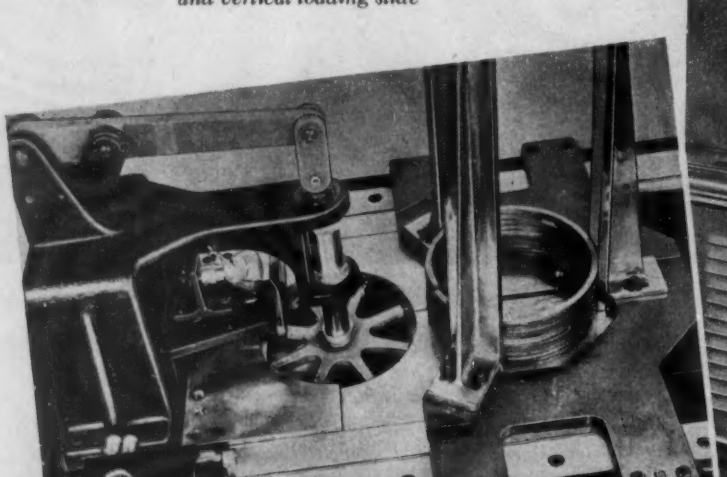
Single purpose machine shown in Fig. 1 automatically checks oil rings 0.108-in. thick and compression rings ⅛-in. thick. Both have an outside diameter of 5.750-in. Gap in both rings is 0.070-in. wide, with a tolerance of plus and minus 0.0035 in. Compression ring is tapered, but the oil ring has a profiled periphery. The machine will check an average of 1500 of these rings per hour and can be adapted to other sizes and types of piston rings by changing various elements of the tooling.

Piston rings are segregated into three groups—(1) acceptable periphery and gap, (2) reject gap and (3) reject periphery, because of failure to meet requirements. Entire checking and separating operation is done automatically. All operator does is load the rings into

(*Please turn to Page* 168)

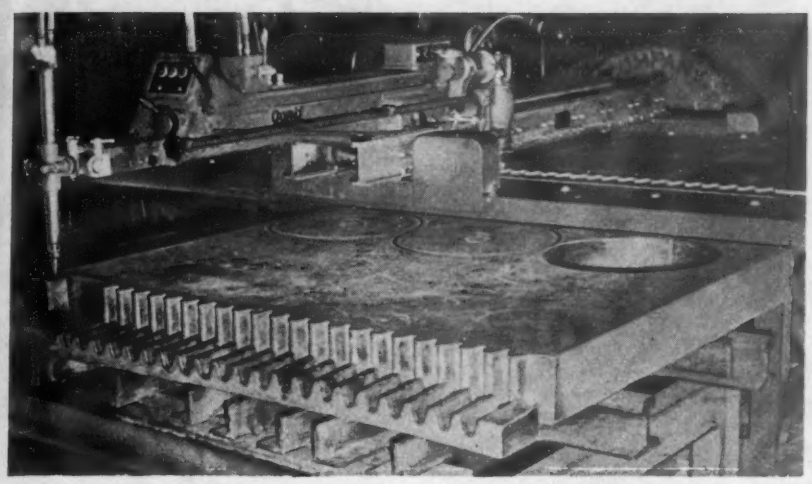
Fig. 1 (right)—Acceptable piston rings slide out of this inspection unit on to front rack. Rejects are on side rack

Fig. 2 (below)—Cover of unit is removed to reveal optical scanning system with compression plate, feed slide, and vertical loading slide



SAVE 50%

Of Replacement Cost By Flame-Cutting Cinder Car Rack



SAVING of more than 50 per cent of the cost of a new piece of equipment was recently realized by a steel plant through use of an oxyacetylene shape cutting machine. The plant needed a replacement for a cinder car rack, a structure 5 ft by 4 in. by 2¼ in., used to hold the cinder car while it is tipped to discharge its molten slag. To avoid the high cost and lengthy delay that would be involved in making a pattern and mold for the single casting, it was decided to flame-cut the part from a 5 in. thick steel slab with an Oxweld CM-12 shape cutting machine manufactured by Linde Air Products Co., New York.

Since only a limited number of the racks were to be cut, a templet for guiding the cutting machine was sawed out of ¼-in. composition board instead of using the standard aluminum templet strip. This faster, cheaper method was entirely satisfactory for this application because the templet was used only a few times.

Total cost for material and cutting for each rack was estimated at $18.30 as compared with $40, estimated cost of a new part. The illustration shows that flame-cutting was sufficiently accurate to eliminate machining of the part. A further saving is realized by this steel plant since it is now unnecessary to stock these racks as replacements, or wait for delivery when needed.

AUTOMATIC HEAT for FORGING

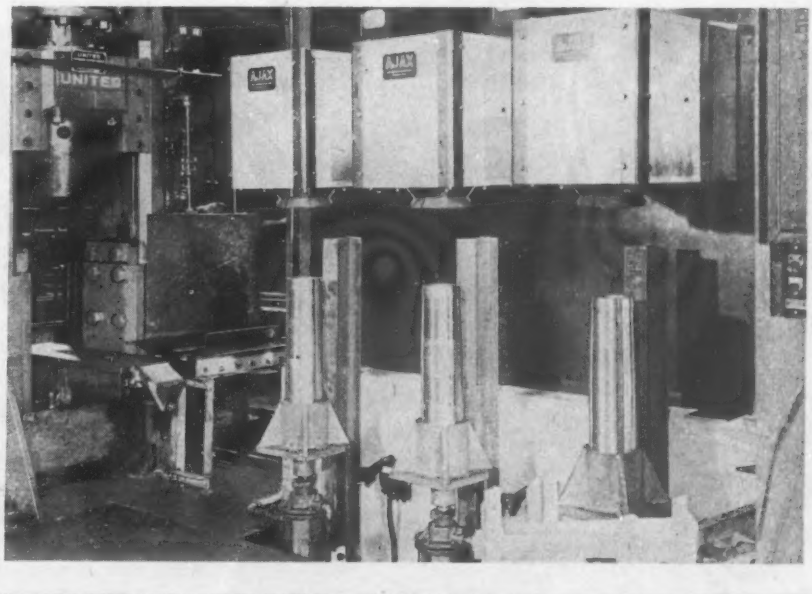
—by means of an induction unit

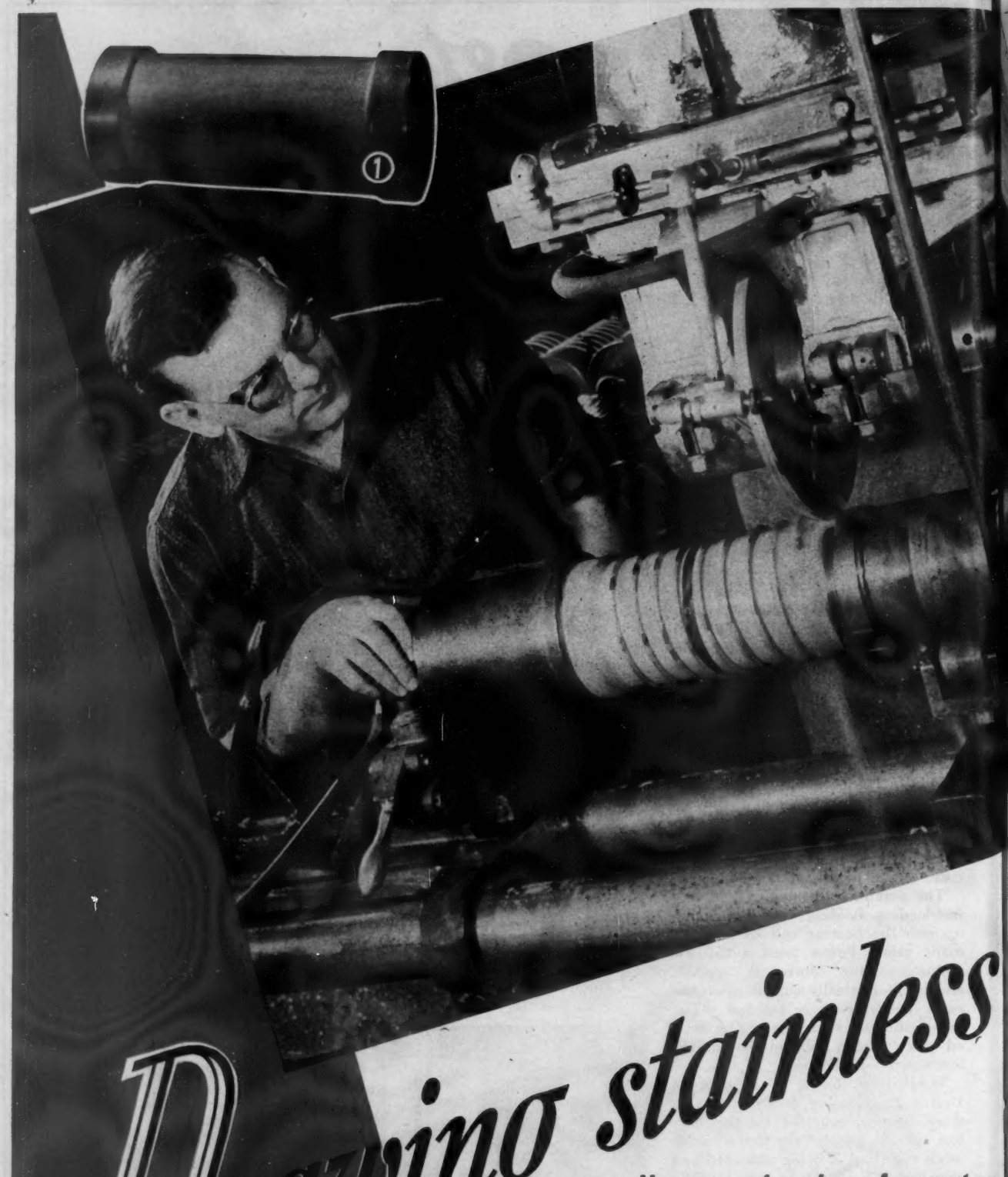
INDUCTION heaters of a new design, mounted vertically on a compact control cubicle, speed heat treating —of bars or tubes for forging, upsetting or spinning—to the extent of treating one piece per minute.

The part to be heated is held in a fast-loading holding cup and thrust up into the heating coil by a pneumatic ram. Power from a 250 kw motor-generator source is applied, and is automatically cut off when the exact temperature is reached. The pneumatic ram then lowers the heated piece, which rolls to the forging machine on conveyors.

Installation shows, in a plant of United Engineering & Foundry Co., three heaters mounted on the control cubicle. Two of the heaters work while the third is being unloaded and reloaded. Each piece gets exactly the same heat treatment—top heat at the end, tapering off toward the unworked portion. On the press, a few seconds later, the metal flows smoothly to form the correct shape.

Practically any differential heating pattern can be achieved by proper coil design. The same equipment can be converted to many different heating operations. Scale is negligible, prolonging die life and reducing die cleaning, according to Ajax-Electrothermic Corp., Trenton 5, N. J., builder of the equipment.





Drawing stainless C

Vacuum chambers for water-cooled ignition tubes are drawn in two diameters by an ingenious setup

By L. E. BROWNE
Associate Editor, STEEL

INN
vacuu
tion tu
drawn
basis b
ment o
haven,
utensil
stockp
were f
mium-
ends.
practic
stainle
Burver
compa
Electri
Cyli
in. dia
are 5.
tremit
greate

Decem

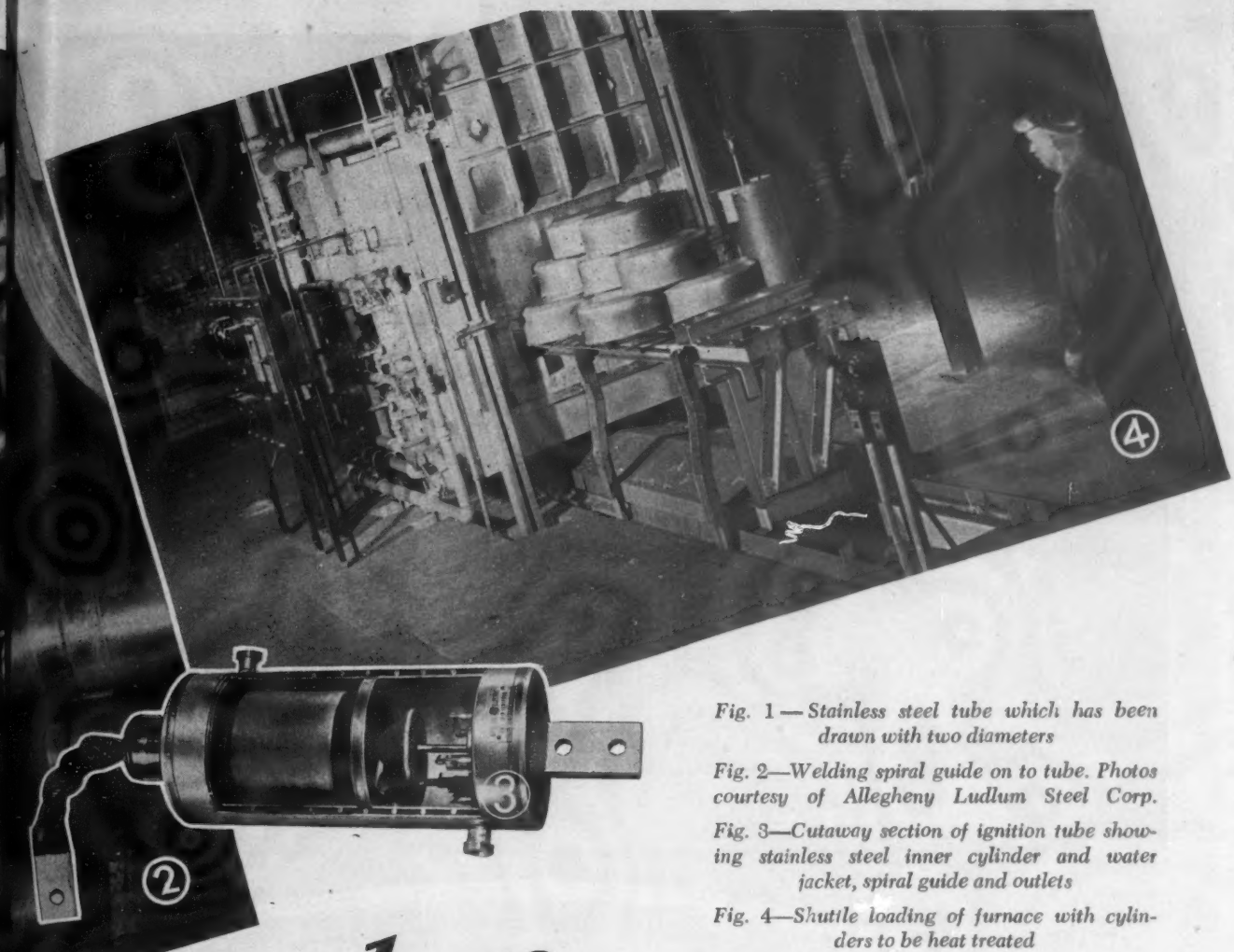


Fig. 1 — Stainless steel tube which has been drawn with two diameters

Fig. 2—Welding spiral guide on to tube. Photos courtesy of Allegheny Ludlum Steel Corp.

Fig. 3—Cutaway section of ignition tube showing stainless steel inner cylinder and water jacket, spiral guide and outlets

Fig. 4—Shuttle loading of furnace with cylinders to be heat treated

cylinders

INNER CYLINDERS which serve as vacuum chambers for water-cooled ignition tubes of stainless steel (Fig. 3) are drawn in two diameters on a production basis by an unusual engineering development of Lalance & Grosjean Co., Woodhaven, N. Y., pioneers in forming metal utensils, from drinking cups to 56-gal stockpots. Cylinders (Fig. 1) formerly were fabricated of 5 in. seamless chromium-nickel tubing, expanded at both ends. When this tubing became scarce, practice for drawing them from No. 347 stainless sheets was worked out by Ben Burvenick Sr., vice president of the company, in co-operation with General Electric and Westinghouse engineers.

Cylinders are in two lengths of 4.834-in. diameter, except for the ends which are 5.229-in. in diameter. As both extremities of the cylinder are drawn to greater diameter than the mid-section, this presented a major problem. Material is of No. 13 gage, AISI 347 stainless, chromium 17-20, nickel 8-12, carbon 0.10 max., manganese 2, silicon 0.75, and columbium minimum 10 times the carbon.

Wider diameters with flange on each inner end are produced separately by two differing operations. In rough trimming one, an ash tray is a by-product from the cup. Starting with an 18½-in. blanked circle, double-action hydraulic press and die practice is conventional at average 40-ton capacity, until first of the wider flanged sections is drawn. For lubricant, extra heavy Kondor is used, practically grease in density. In cleaning between each anneal, Savasol, which evaporates quickly, an important factor in view of heavy lubricant, is employed.

Annealing temperatures are held at 1950° F for 20 min in a gas-fired radiant heat Selas furnace (Fig. 4). This furnace has a shuttle type loading system with platform at each end. Grates have a capacity of 36 cylinders, one being loaded while the other is in the furnace. There are five anneals and seven press operations, which for a relatively small thin work piece gives close control.

First draw on the 18½-in. blank with holder on top of the work produces a shell 11 in. in diameter by 5 in. deep. With the blank holder inside the work as in subsequent draw operations, second reduction forms a cup 9 x 7 in..

Height exceeds diameter after the third draw, cylinder being 10 in. high by 7 in. in diameter. Tube is 6 in. in diameter and 11½ in. long after the fourth press operation. There is no anneal following this draw. Cooling after each anneal is to handling temperature. Fifth draw, before first of two wider end sections is formed, makes the cylinder 12½ in. high with 5.229-in. diameter.

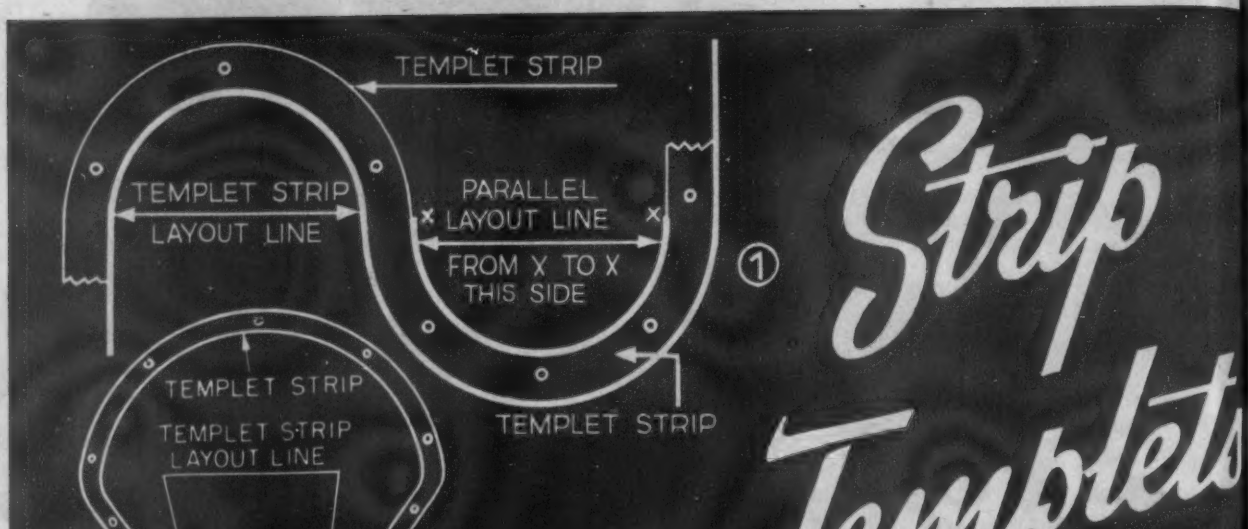
With section dies, top of the shell is held at 5.229 in. for a depth of 2¼ in., while the remainder of the cylinder is reduced to 4.834 in., flange and rough edge being formed on the wider section. Cylinder is now 4.834 in. in diameter, except for 2¼ in. at 5.229 in.

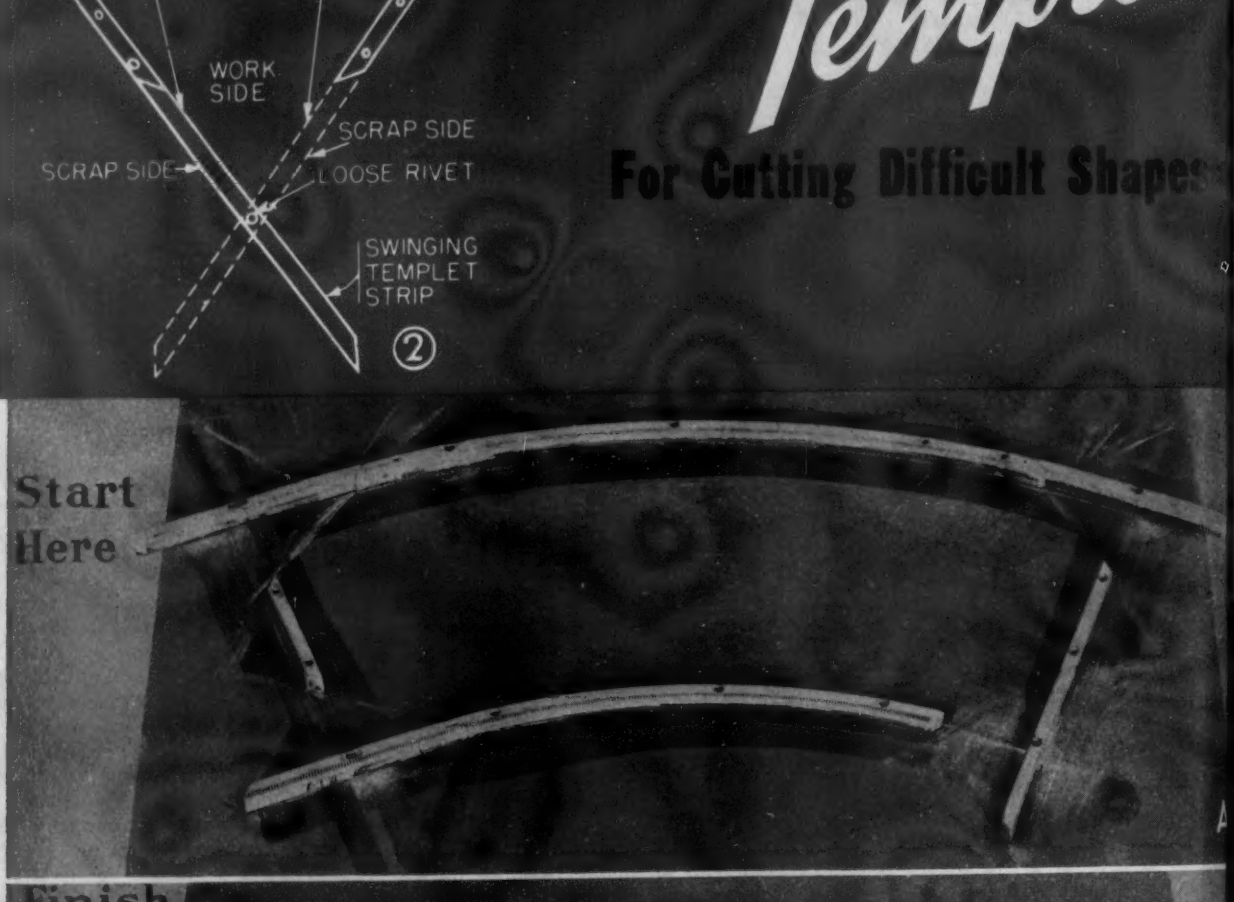
Following another anneal, cylinder is rough trimmed at both ends. The wider diameter top section is trimmed in 1 9/16 in. from 2½ in. At the still closed end, trimming produces a stainless steel ash tray in the sheared cup and the 4.834-in. diameter length is now 11

(*Please turn to Page* 170)

Strip Templets

For Cutting Difficult Shapes





OXY-ACETYLENE machine cutting of difficult shapes may be accomplished with increased accuracy and saving of time with the use of strip templets.

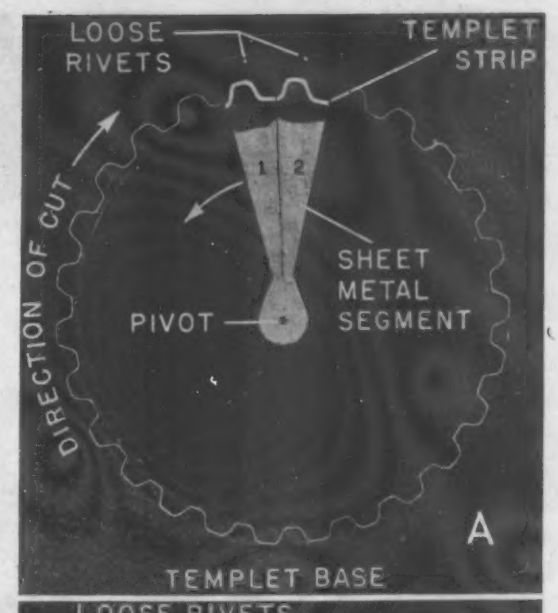
Templet should be so formed that the inside of the bend is against the layout line whenever possible to allow the operator a continuous view of the layout line, according to Linde Air Products Co., New York City. This is often impossible when forming complicated shapes containing reverse bends, unless a parallel line is drawn inside the original layout line at a distance equal to the thickness of the templet strip, as shown in Fig. 1.

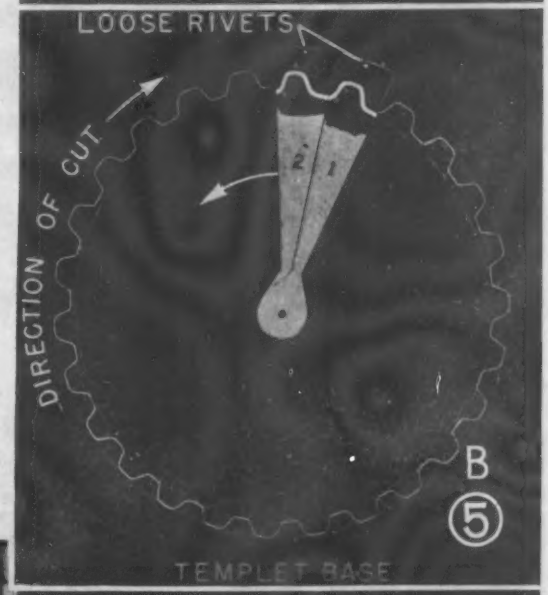
Fig. 2 shows how a sharp corner may be produced by the incorporation of a swinging section in the templet. Usual method should be followed for determining nozzle size and kerf width, for scribing the layout line on templet base, and for forming the templet and riveting it to base plate. Only difference is that one section of templet should be left out. Ends of the templet strip that are riveted to the base should be cut at a 30° angle. A straight piece of templet strip should then be fitted to the layout line, with ends of this piece also cut at a 30° angle to match the ends of the riveted section.

Straight section should be attached to the templet base with one rivet, loosely enough for the strip to be rotated. Center point of the hole for the rivet should be located directly outside that point in the layout line where the center lines of the two templet strips intersect. During operation, the swinging section of the templet should be turned to meet one end of the stationary section. Templet tracing unit of the cutting machine is placed on the swinging section outside the rivet so that cut will start in scrap. After tracing unit has moved off the swinging section and on to stationary section, the swinging section is rotated to meet the other end of stationary section.

Fig. 3 illustrates the starting (a) and finishing positions (b) of a gated templet for a shape requiring four sharp corners. Tracing unit must be watched carefully and the gate must be

(*Please turn to Page* 172)





5

4

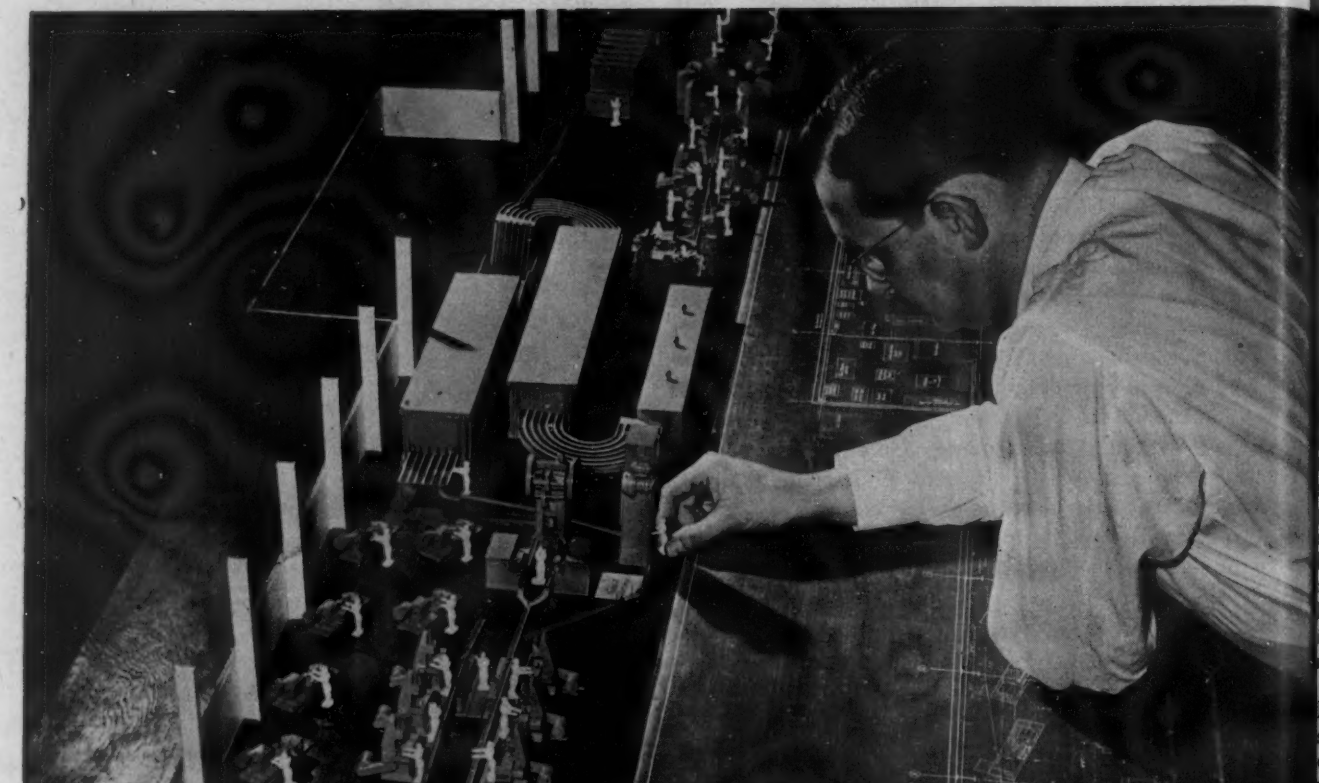


Fig. 1—Overall view of model production line

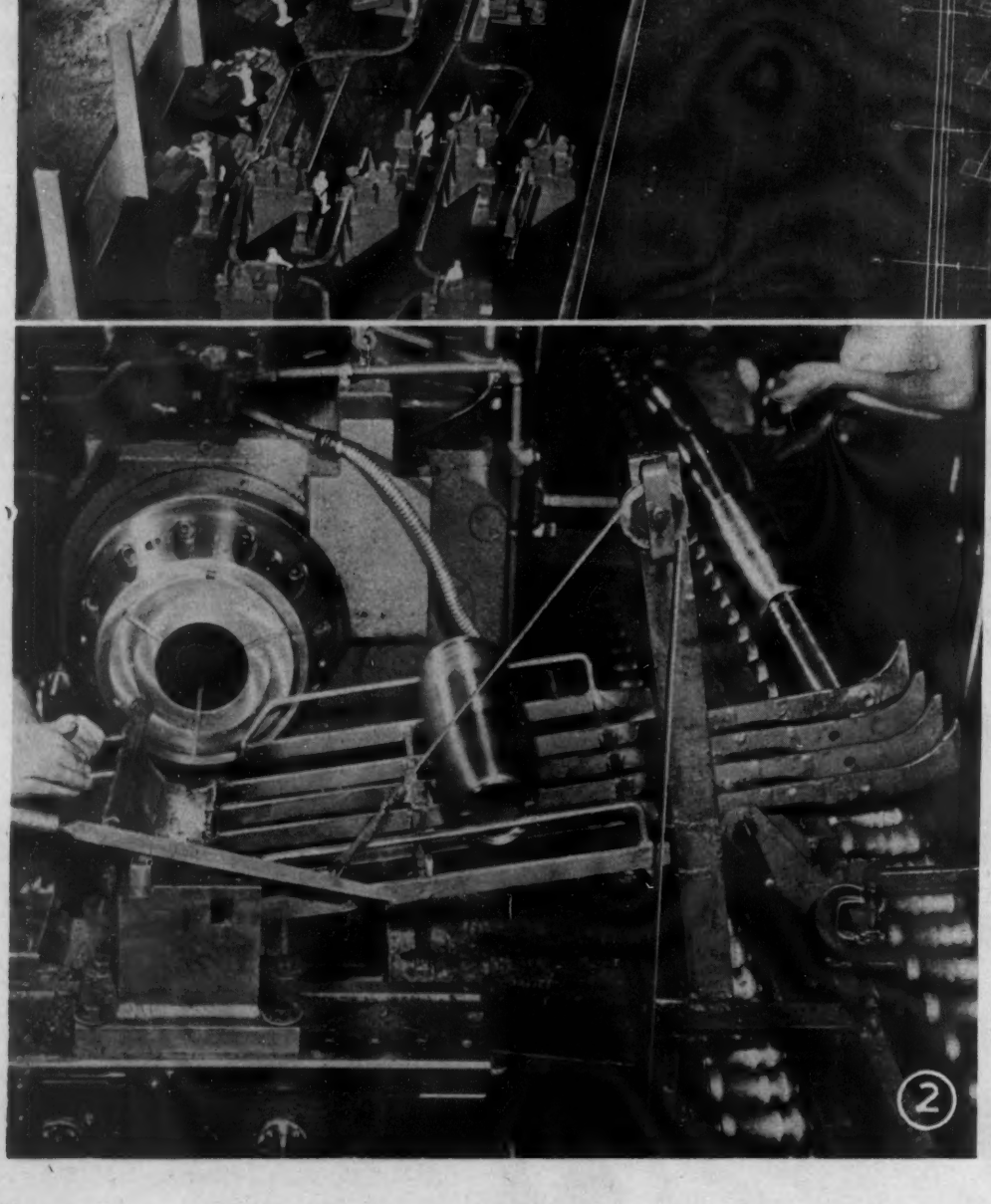


Fig. 2 — Time for handling head from conveyor line to chucking reduced to 7 sec by this special tray

Fig. 3—Tooling arrangement on HVAR head rough-turning lathes

Fig. 4—Multiple tooling setup used on turret lathes for boring and counterboring base end of projectile

Fig. 5—Two rough forgings cut to length in one operation on circular saw equipped with hydraulic locator and ejector

Fig. 6—Nosing operation on a 250-ton hydraulic press

Twin Production Lines

Naval Ordnance plant at Canton achieved remarkable output through special tooling and efficient handling arrangements

By W. G. MILLER
Westinghouse Electric Corp.
East Pittsburgh, Pa.

IN MAKING rockets for the Navy at the Canton Naval Ordnance Plant, Canton, O., operated by Westinghouse Electric Corp., special attention was given to tooling its machines and to the materials handling problem. As a result, the plant wound up its rocket production schedule with a record unsurpassed by any other producer of similar parts. In addition, effective disposition and nature of facilities figured heavily in approval of this property and its acquisition by the Navy as a permanent Navy shore establishment on Dec. 3.

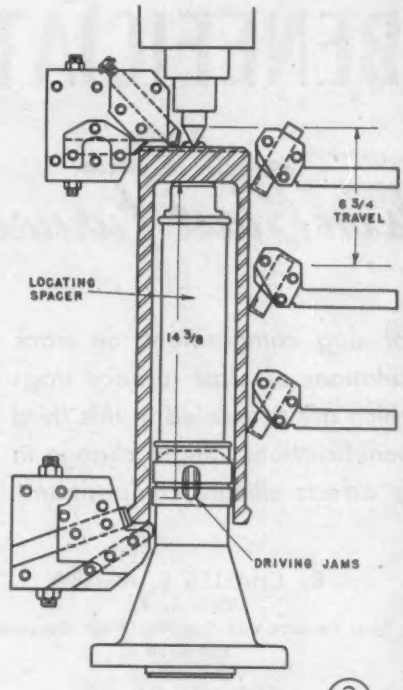
Under the setup used by the Westinghouse management work moved from station to station with little handling by operators. No worker had to move work more than 2 ft (maximum) to and from his machine either to get raw materials or to dispose of a finished job. All conveyors were gravity operated, with powered belts at regular intervals to bring work to the men at waist or chest level; all were of standard design. Layout differed from most jobs in that each work station, consisting of from one to six machines, was connected in sequence. This arrangement made for increased efficiency and lower unit costs. "Hospital zones" or repair stations were spotted at several points along lines to repair minor defects which occurred during manufacture.

There were two main production lines. One manufactured the spinner head, the other, a part known as the "HVAR head". Spinner head was smaller than HVAR head which resembled a 5-in. artillery shell (except that its casing was threaded, both inside and out, at the base, so as to screw on to the rocket motor). Although tooling was different for these two projectiles, the two lines were similar in many ways and machine tools and equipment did essentially the same work.

Before laying out this project, production requirements were carefully analyzed to determine the types and numbers of machine tools needed. Factor of versatility was an important consideration both in selecting metal working equipment and in layout out lines in order that conversion could be made to other types of projectiles if necessary.

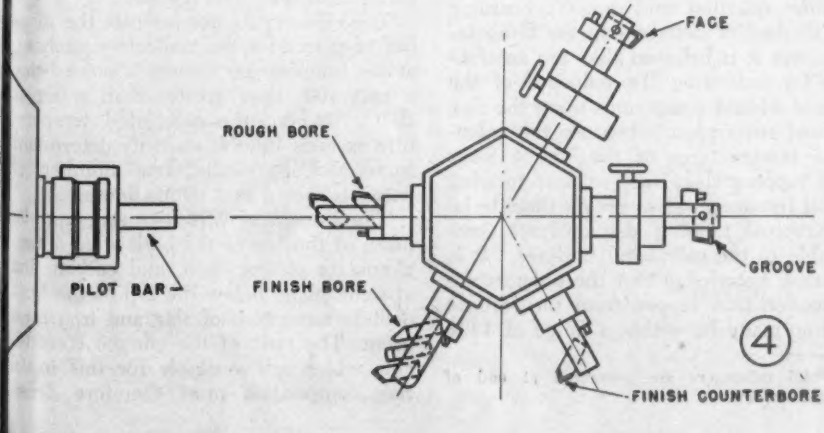
To help visualize ultimate manufac-

(*Please turn to Page* 174)



MULTIPLE TOOLING ON VERTICAL TURNING LATHE ③
ROUGH FINISH O.D.

WORKING SPEED - 350 RPM
TURNING FEED - .020
FACING FEED - .020
DEPTH OF CUT - 1/8" TO 3/8"
CARBIDE TOOLS



④

⑤

⑥

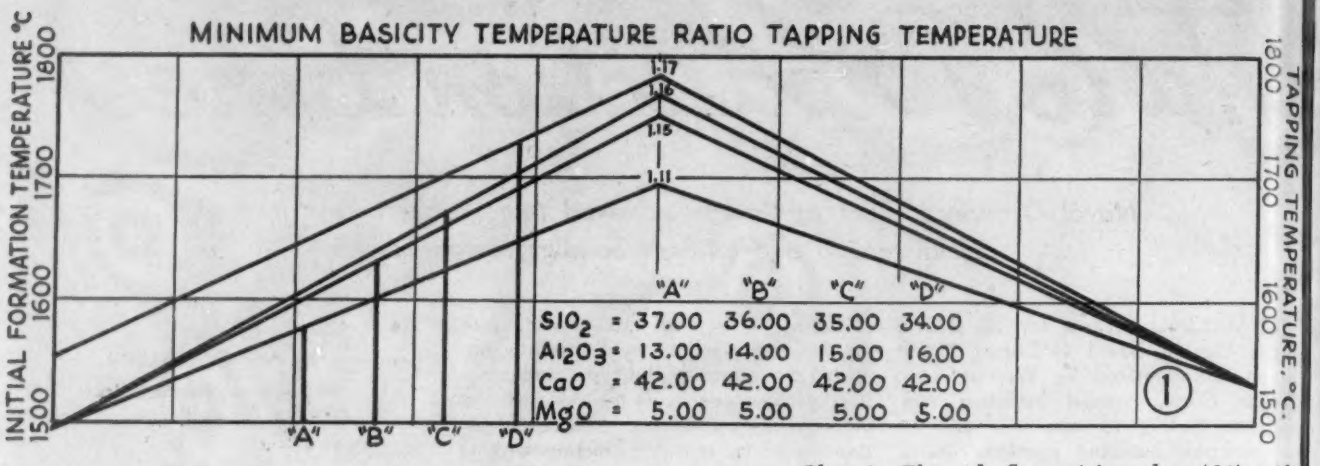


Chart 1—Thermal effects of four slags (3% acid)

Principles of IRON ORE BENEFICIATION *and Their Effects on Blast Furnace Operation*

Interesting thermal influences of slag compositions on stack operation are disclosed by calculations of blast furnace slags from burdens of equal weight which are presented in this third article in the series of four on beneficiation. Slight change in slag constituent ratio markedly affects silicate compositions

By CHARLES E. AGNEW
Consultant
Blast Furnace and Sintering Plant Operations
Cleveland

COMPONENTS of 16 tetrahedrons are listed by McCaffery[11], eight of which are commonly encountered in the slags of American coke furnaces. These eight are presented in Table II, numbered as by McCaffery, showing the chemical composition of each component, its melting temperature in degrees C, and the respective groupings.

Table I is a calculation of four blast furnace slags from burdens of equal weight showing the pounds of gangue which are theoretically available for producing slag at four different stages of composition, from the initial formation to the tapping stage. All conditions have been held constant throughout the four calculations except the variation in the pounds of ore gangue constituents necessary to produce the slags it was desired to compare.

The slag of each stage is then calculated to its percentage composition of the four principal slag constituents (SiO_2, Al_2O_3, CaO, MgO) as normally reported by the chemical laboratory, leaving 3 per cent for the minor constituents. After conversion to the 100 per cent oxide composition the tetrahedron for each analysis is determined from a McCaffery diagram. With the tetrahedron determined each slag is then calculated to its silicate composition from which a calculated temperature is determined from a mathematical average of the known silicate melting temperatures based upon the existing percentages of the respective silicates.

Some question may arise concerning the method of determining the temperatures but it is believed they are satisfactory for indicating the influence of the various silicate compounds upon the slag thermal requirements because the calculated temperatures of the No. 4 Slags (the tapping slags) are so near to what actual furnace practice proves them to be with actual tapping slag analyses comparable to the calculated analyses. It is common knowledge that the temperature of molten iron tapped from the furnace will normally be within a range of 1400 to 1550°C, with the steelmaking grades usually about 1500°C. It is also common knowledge that the temperature of the slag is always slightly higher than the iron which is produced with it. Since the calculated temperature of the tapping slags of Table I is 1528°C it seems reasonable to accept the calculated temperature as indicative of the necessary "free running" temperature of slags of the silicate composition calculated. Bureau of Mines research[12] points out that the free running temperature of slag is more important to actual furnace operation than the melting temperature but that the two generally vary with each other. The actual melting temperatures of slag compositions as calculated would probably be lower than the temperatures shown but it is open to question whether or not they would serve the purpose of indicating the thermal requirements for free running slags of the compositions shown any better than the method used.

The viscosity figures indicate the number of poises for the respective analyses, at the temperature shown, a poise being a unit 100 times greater than water at 20°C. Where the calculated temperature exceeds 1600°C viscosity determined from McCaffery diagrams number of poises is shown as a minus figure.

The Bureau of Mines[4] slag samples taken at the top of the bosh were a conglomerate of slag, iron, and carbon, but at some plane below the top of the bosh definite separation of slag and iron must occur. The ratio of the gangue constituents which are available for this initial slag composition must therefore deter-

[11][12] All references are presented at end of Installment IV.

TABLE I—CALCULATION OF FOUR BLAST FURNACE SLAGS FROM BURDENS OF EQUAL WEIGHT (3% Acid)

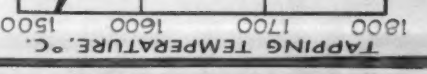


TABLE I—CALCULATION OF FOUR BLAST FURNACE SLAGS FROM BURDENS OF EQUAL WEIGHT
(3% Acid)

Calculation	A					B					C					D				
Constituents, pounds:	SiO_2	Al_2O_3	CaO	MgO	Total slag	SiO_2	Al_2O_3	CaO	MgO	Total slag	SiO_2	Al_2O_3	CaO	MgO	Total slag	SiO_2	Al_2O_3	CaO	MgO	Total slag
No. 1 Slag—Gangue, ore and stone ..	2020	280	2420	250	5124	1960	340	2420	250	5124	1900	400	2420	250	5124	1840	460	2420	250	5124
No. 2 Slag—Gangue, ore and stone ..	2020	280	2420	250		1960	340	2420	250		1900	400	2420	250		1840	460	2420	250	
87% silicon in iron	435					435					435					435				
	1585	280	2420	250	4675	1525	340	2420	250	4675	1465	400	2420	250	4675	1405	460	2420	250	4675
No. 3 Slag—Gangue, ore and stone..	2020	280	2420	250		1960	340	2420	250		1900	400	2420	250		1840	460	2420	250	
24% of coke ash	168	120	24	12		168	120	24	12		168	120	24	12		168	120	24	12	
	2188	400	2444	262		2128	460	2444	262		2068	520	2444	262		2008	580	2444	262	
87% silicon in iron	435					435					435					435				
	1753	400	2444	262	5009	1693	460	2444	262	5009	1633	520	2444	262	5009	1573	580	2444	262	5009
No. 4 Slag—Gangue, ore and stone ..	2020	280	2420	250		1960	340	2420	250		1900	400	2420	250		1840	460	2420	250	
100% of coke ash	700	500	100	50		700	500	100	50		700	500	100	50		700	500	100	50	
	2720	780	2520	300		2660	840	2520	300		2600	900	2520	300		2540	960	2520	300	
100% silicon in iron	500					500	...	....	...		500					500				
	2220	780	2520	300	6000	2160	840	2520	300	6000	2100	900	2520	300	6000	2040	960	2520	300	6000
Constituent, percentages—Slag	No. 1	2	3	4		1	2	3	4		1	2	3	4		1	2	3	4	
SiO_2	39.42	33.90	35.00	37.00		38.25	32.62	33.80	36.00		37.08	31.33	32.60	35.00		35.90	30.05	31.40	34.00	
Al_2O_3	5.46	5.99	7.98	13.00		6.63	7.27	9.18	14.00		7.81	8.56	10.38	15.00		8.98	9.84	11.58	16.00	
CaO	47.23	51.76	48.79	42.00		47.24	51.76	48.79	42.00		47.23	51.76	48.79	42.00		47.24	51.76	48.79	42.00	
MgO	4.88	5.35	5.23	5.00		4.88	5.35	5.23	5.00		4.88	5.35	5.23	5.00		4.88	5.35	5.23	5.00	
	96.99	97.00	97.00	97.00		97.00	97.00	97.00	97.00		97.00	97.00	97.00	97.00		97.00	97.00	97.00	97.00	
100.0% oxides																				
SiO_2	40.64	34.94	36.08	38.15		39.40	33.63	34.85	37.11		38.23	32.30	33.61	36.08		37.01	30.98	32.37	35.05	
Al_2O_3	5.63	6.18	8.23	13.40		6.84	7.49	9.46	14.43		8.05	8.82	10.70	15.46		9.26	10.14	11.93	16.49	
CaO	48.69	53.36	50.30	43.30		48.70	53.36	50.30	43.30		48.69	53.36	50.30	43.30		48.70	53.36	50.30	43.30	
MgO	5.03	5.52	5.39	5.15		5.03	5.52	5.39	5.15		5.03	5.52	5.39	5.15		5.03	5.52	5.39	5.15	
	99.99	100.00	100.00	100.00		99.97	100.00	100.00	99.99		100.00	100.00	100.00	99.99		100.00	100.00	99.99	99.99	
Tetrahedron No.	6	7	8	6		6	7	7	6		6	14	7	6		8	14	7	6	
Silicate compounds, °C.																				
Akermanite 1458	34.01	20.41	36.44	34.82		34.01	8.52	35.36	34.82		34.01	.....	24.11	34.82		34.01	.....	12.95	34.82	
Tricalcium disilicate 1475	39.29	....	10.68	1.56		41.77	.....	.....	3.60		44.05	.....	.....	5.63		32.91	.....	.....	7.65	
Monticellite 1498	....	9.69	....	....		...	16.53	0.61	....		.....	19.42	7.07	....		.....	12.54	13.48	....	
Calcium bisilicate 1540	11.53	....	....	27.54		5.79	.....	.....	22.74		0.25	.....	.....	17.94		.....	.....	....	13.14	
Anorthite 1551	....	....	....	....		....	.....	.....	....		.....	.....	.....	....		.....	.....	....	....	
Madisonite 1567	...	....	....	....		...	.....	.....	....		.....	.....	.....	....		.....	.....	....	....	
Gehlenite 1590	15.14	16.62	22.14	36.04		18.40	20.15	25.45	38.81		21.65	23.72	28.78	41.58		24.91	27.27	32.09	44.35	
Calcium orthosilicate 2130	....	53.27	30.78	....		...	54.80	38.58	....		.....	56.34	40.04	....		8.13	57.90	41.48	....	
Magnesium oxide 2650	....	....	....	....		...	.....	.....	....		.....	0.52	.....	....		.....	2.29	....	....	
	99.97	99.99	100.04	99.96		99.97	100.00	100.00	99.97		99.96	100.00	100.00	99.97		99.96	100.00	100.00	99.96	
Calculated free running temp. °C. ..	1494	1842	1696	1528		1494	1859	1751	1525		1494	1882	1768	1528		1551	1915	1784	1528	
Ratio to tapping temp.	0.97	1.20	1.11	....		0.97	1.22	1.15	....		0.97	1.23	1.16	....		1.01	1.27	1.17	....	
Viscosity—poises	2	—3	—3	4		2	—3	—3	4		2	—3	—3	4		2	—3	—3	4	

mine that composition. The theoretical minimum slag constituents available at this initial stage of formation would be the gangue of the ore and the stone only. The No. 1 slags of the calculations in Table I represent this initial formation.

Every blast furnace operation has a slag composition stage of maximum basicity which is governed by at least three factors, (1) the amount of silica reduced to silicon, (2) the percentage of ash in the coke, (3) and the percentage of coke ash assimilated by the slag when part of the coke carbon is lost in solution to the furnace gas. This silicon in the iron is the only one of these factors which offers a practical means of regular determination. The percentage of coke ash entering the furnace will be reasonably uniform from a given coal mix but whatever that ash content may be sufficient bases must be carried through the bosh to flux that part of the ash which is not released until the coke is fully consumed at the tuyeres.

The degree of basicity in the slag caused by the bases needed to flux the coke ash therefore will vary with the percentage of ash assimilated by the slag as some carbon is lost to gas solution. The Bureau of Mines research reported 13 per cent of carbon lost in gas solution in a Southern furnace operation[3] and 26.7 per cent lost in a Northern furnace operation[5], indicating the variable nature of this reaction. Slags Nos. 2 and 3 of the calculations show the extremes of basicity in the bosh slags. The No. 4 slags are the compositions as tapped.

Each of the A-B-C-D calculations attempts to show the composition of a given slag at its different stages during its passage through the furnace hearth and bosh:

Slag No. 1—The theoretical initial slag formed at the top of the bosh from the slag forming constituents available at that stage.

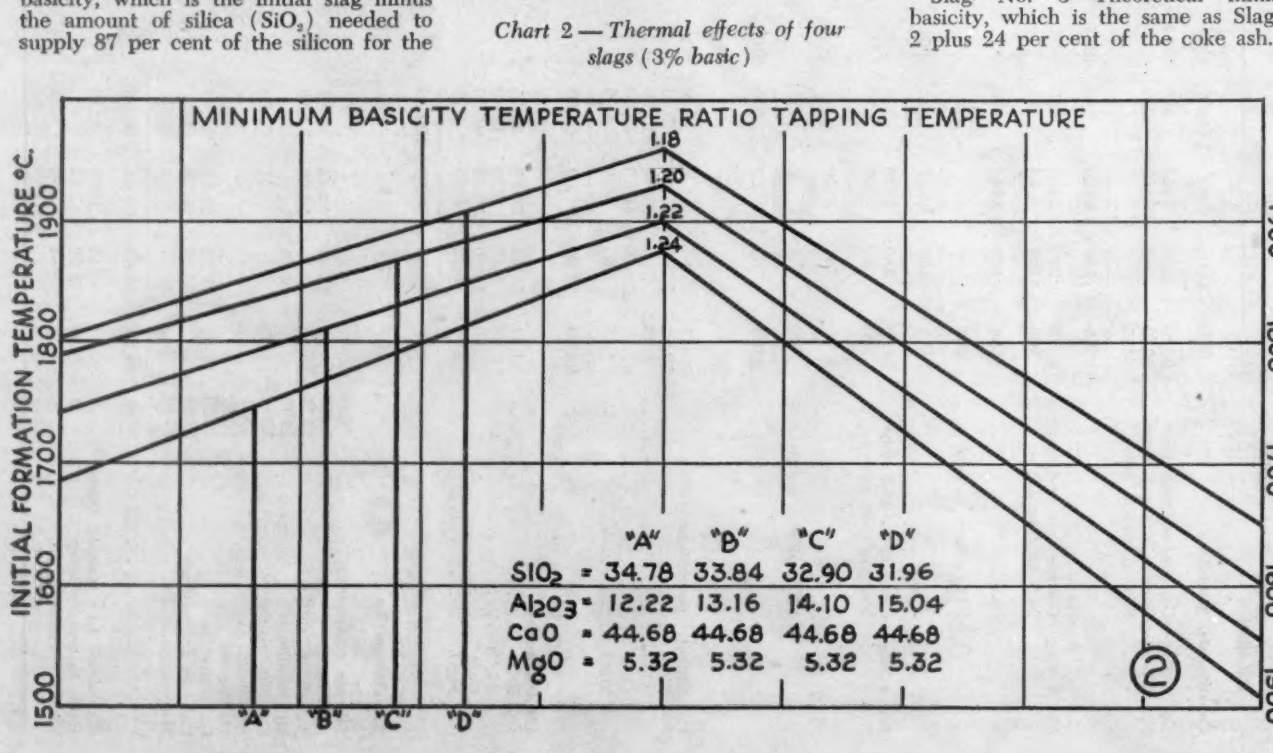
Slag. No. 2—Theoretical maximum basicity, which is the initial slag minus the amount of silica (SiO_2) needed to supply 87 per cent of the silicon for the iron. The Bureau of Mines research[4] found that 87 per cent of the silicon entered the iron in the bosh and the balance in the coke combustion zone.

Slag No. 3—Theoretical minimum basicity, which is the same as Slag No. 2 plus 24 per cent of the coke ash. The

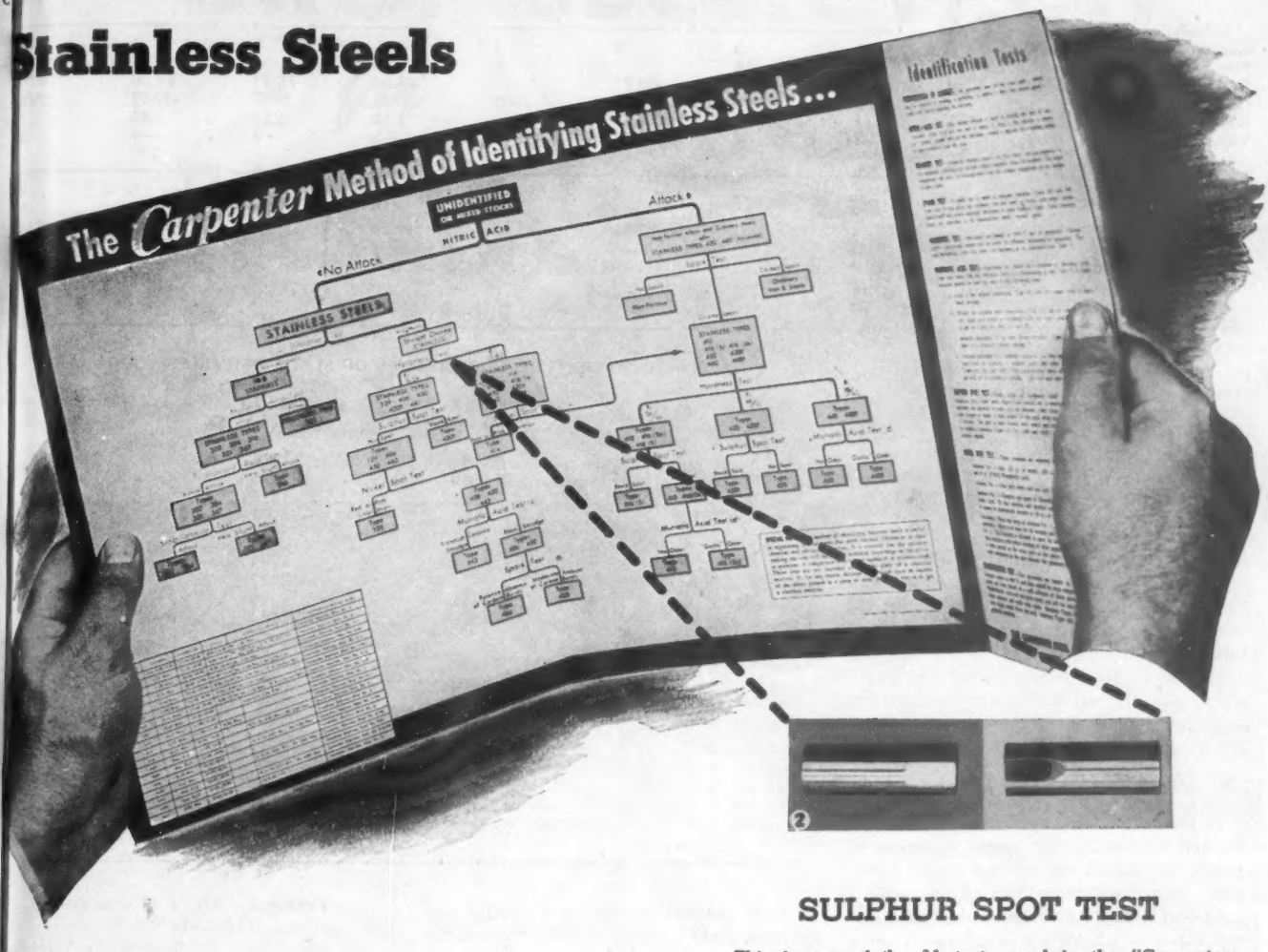
TABLE II—CHEMICAL COMPOSITION OF EIGHT TETRAHEDRONS

	Composition	Melting temp., °C
Tetrahedron No. 2		
Akermanite	$2CaO — MgO — 2SiO_2$	1458
Anorthite	$CaO — Al_2O_3 — 2SiO_2$	1551
Calcium bisilicate	$CaO — SiO_2$	1540
Gehlenite	$2CaO — Al_2O_3 — SiO_2$	1590
Tetrahedron No. 5		
Akermanite	$2CaO — MgO — 2SiO_2$	1458
Anorthite	$CaO — Al_2O_3 — 2SiO_2$	1551
Gehlenite	$2CaO — Al_2O_3 — SiO_2$	1590
Monticellite	$CaO — MgO — SiO_2$	1498
Tetrahedron No. 6		
Akermanite	$2CaO — MgO — 2SiO_2$	1458
Calcium bisilicate	$CaO — SiO_2$	1540
Gehlenite	$2CaO — Al_2O_3 — SiO_2$	1590
Tricalcium disilicate	$3CaO — 2SiO_2$	1475
Tetrahedron No. 7		
Akermanite	$2CaO — MgO — 2SiO_2$	1458
Calcium orthosilicate	$2CaO — SiO_2$	2130
Gehlenite	$2CaO — Al_2O_3 — SiO_2$	1590
Monticellite	$CaO — MgO — SiO_2$	1498
Tetrahedron No. 8		
Akermanite	$2CaO — MgO — 2SiO_2$	1458
Calcium orthosilicate	$2CaO — SiO_2$	2130
Gehlenite	$2CaO — Al_2O_3 — SiO_2$	1590
Tricalcium disilicate	$3CaO — 2SiO_2$	1475
Tetrahedron No. 13		
Anorthite	$CaO — Al_2O_3 — 2SiO_2$	1551
Gehlenite	$2CaO — Al_2O_3 — SiO_2$	1590
Madisonite	$2CaO — 2MgO — Al_2O_3 — 3SiO_2$	1567
Monticellite	$CaO — CaO — SiO_2$	1498
Tetrahedron No. 14		
Calcium orthosilicate	$2CaO — SiO_2$	2130
Gehlenite	$2CaO — Al_2O_3 — SiO_2$	1590
Magnesium oxide	MgO	2500 — 2800
Monticellite	$CaO — MgO — SiO_2$	1498
Tetrahedron No. 16		
Madisonite	$2CaO — 2MgO — Al_2O_3 — 3SiO_2$	1567
Gehlenite	$2CaO — Al_2O_3 — SiO_2$	1590
Magnesium oxide	MgO	2500 — 2800
Monticellite	$CaO — MgO — SiO_2$	1498

Chart 2 — Thermal effects of four slags (3% basic)



To Help You Identify Stainless Steels



SULPHUR SPOT TEST

This is one of the 11 tests used in the "Carpenter Method of Identifying Stainless Steels".

Place three drops of Sulphuric Acid solution (one part Sulphuric Acid, three parts water) on a newly-ground spot of the specimen and allow to react for one minute. One drop of a 5% solution of Lead Acetate in water is then added to the acid drop and allowed to react for 15 seconds. The spot is then washed with water and examined. A positive test for Sulphur (Stainless Types 416 (S), 420F and 430F) is the presence of a black sulphide deposit.

YOU know the troubles a mix-up in Stainless stock can cause in heat treating, machining, stamping, welding or other fabricating operations. So it's important to you to have a quick method for identifying Stainless that may become mixed in stock.

The Carpenter Laboratories have developed a new and simplified chart for identifying various types of Stainless Steel. The Chart diagrams and explains the nitric acid test, magnet, spark, hardness, and muriatic acid tests, sulphur spot and nickel spot tests, and the stabilization test, and shows when and how to use each one. With this chart you can check the identity of Stainless Steels which may be in question.

Use it in your laboratory, to help your stockroom, warehouse or production department check on mixed stocks. To obtain a copy, simply fill out the coupon.

Carpenter STAINLESS STEELS

THE CARPENTER STEEL COMPANY
139 W. Bern St., Reading, Pa.

Without obligation, please send me your new chart for identifying Stainless Steels.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

(PLEASE PRINT)

TABLE III—CONDENSED DATA ON SLAGS WITH 47% ACID AND 50% BASIC CONSTITUENTS

Calculation	A				B			
Slag No.	1	2	3	4	1	2	3	4
Tetrahedron, No.	8	14	7	6	8	14	14	8
Calcium orthosilicate, %	30.70	74.29	56.77	....	38.64	75.77	58.16	6.70
Calculated temp., °C	1685	2026	1873	1507	1741	2057	1899	1555
Ratio to tapping temp.	1.11	1.34	1.24	....	1.12	1.32	1.22	....
Viscosity, poises	3	—4	—3	3	—3	—4	—4	2

Calculation	C				D			
Slag No.	1	2	3	4	1	2	3	4
Tetrahedron, No.	7	?	14	8	7	?	14	8
Calcium orthosilicate, %	45.38	....	59.51	13.40	46.70	....	60.87	20.10
Calculated temp., °C	1788	....	1928	1602	1804	....	1958	1649
Ratio to tapping temp.	1.12	....	1.20	....	1.09	....	1.18	....
Viscosity, poises	—3	....	—4	2	—3	....	—4	2

percentage is assumed to represent the amount of ash available for assimilation due to carbon solution loss.

Slag No. 4—The tapping slag, containing all of the coke ash but minus the amount of silica (SiO_2) needed to supply 100 per cent of the silicon for the iron.

The four slags of each calculation must be reasonably representative of the stages of chemical and silicate composition through which slags of the final compositions (the No. 4 Slags) must pass in their formation from the initial to the tapping composition. In actual practice the maximum basicity of the lower bosh slags probably would be somewhere between the two extremes of Slags Nos. 2 and 3.

Reveals Thermal Effects

A study of the calculations brings to light some interesting thermal effects of slag composition upon the furnace operation and emphasizes McCaffery's teachings that a slight change in slag constituent ratios can have a marked effect upon the silicate compositions. The description of the six various actual furnace operations previously cited shows the best furnace practice was obtained when the tapping slag chemical composition was classified in tetrahedron No. 6. The calculations strongly indicate that the reason for the advantage is the ability to maintain a higher concentration of heat in the lower bosh with a minimum of heat drained from the bosh when a tetrahedron No. 6 slag is tapped from the furnace than is possible in any other tetrahedron. The preferred chemical composition of tapping slag indicated in the calculation (No. 4 Slags—calculations B and C) has long been recognized as the ideal by most experienced blast furnace operators but the calculations are of interest because the silicate compositions show why it is the preferred.

Of the several silicate compounds which are formed in slags of a normal blast furnace operation the calcium orthosilicate ($2CaO\text{-}SiO_2$) melts at the highest temperature (2130°C) and consequently exerts a greater influence for increasing slag temperature than any of the other compounds. The slag calculations show this influence can be favorable or unfavorable to the furnace operation depending upon the stage of formation and the percentage of the compound in relation to the percentage of the other compounds.

In the tapping slags designated No. 4 of each calculation the silica (SiO_2) and alumina (Al_2O_3) total 50 per cent and the calcium (CaO) and magnesium (MgO) oxides 47 per cent, leaving 3 per cent for the minor constituents. In common blast furnace practice such a slag would be classified as 3 per cent acid, or as a 1.06:1.00 acid/base ratio. In the four calculations the silica and alumina percentages vary from 37 SiO_2 and 13 Al_2O_3 to 34 SiO_2 and 16 per cent Al_2O_3. Throughout the four calculations the total bases and the ratio of the bases to each other have been held constant. The thermal effects indicated by these several compositions support the statement previously made that the relation of the slag compositions to each other at the different stages of composition is the important factor in thermal efficiency of the hearth and bosh operation and not the composition of the tapping slag alone. Chart 1 shows the thermal effects graphically.

A critical condition in temperature concentration has been approached and passed in the four calculations. The formation temperature of the No. 1 Slags of calculations A-B-C are identical at 1494°C while No. 1 slag of calculation "D" is 1551°C. The effect of the changes in silicate composition is shown in the ratio of the minimum basicity temperature of the respective No. 3 Slags to the tapping temperature of the respective No. 4 Slags and by the formation temperature of the No. 1 Slag of calculation D. Calculations A-B-C have low initial formation temperatures with calculation D showing a 57°C (3.81 per cent) increase in its initial formation temperature. Calculations B and C respectively show a 55°C (3.24 per cent) and a 72°C (4.24 per cent) increase in their minimum basicity temperature over calculation A, which is a net gain to heat concentration in the lower bosh, while the 0.90 per cent increase in the minimum basicity temperature of calculation D over that of C is paid for with the 3.81 per cent increase in the No. 1 Slag formation temperature of D over C.

The maximum concentration of heat in the lower bosh indicated by calculations B and C appears to be ideal for the fur-

(*Please turn to Page* 144)

TABLE IV—TEMPERATURE DIFFERENCES OF SLAGS IN TABLES I AND III

	Table I (3% acid), °C	Table III (3% basic), °C	Increase or decrease, %
Calculation A			
Slag No. 1	1494	1685	+12.78
Slag No. 2	1842	2026	+ 9.83
Slag No. 3	1696	1873	+10.45
Slag No. 4	1528	1507	— 1.37
Calculation B			
Slag No. 1	1494	1741	+16.53
Slag No. 2	1859	2057	+10.65
Slag No. 3	1751	1899	+ 8.45
Slag No. 4	1528	1555	+ 1.76
Calculation C			
Slag No. 1	1494	1788	+19.67
Slag No. 2	1882	?	....
Slag No. 3	1768	1928	+ 8.05
Slag No. 4	1528	1602	+ 4.84
Calculation D			
Slag No. 1	1551	1804	+16.31
Slag No. 2	1915	?	....
Slag No. 3	1784	1958	+ 9.75
Slag No. 4	1528	1649	+ 7.91

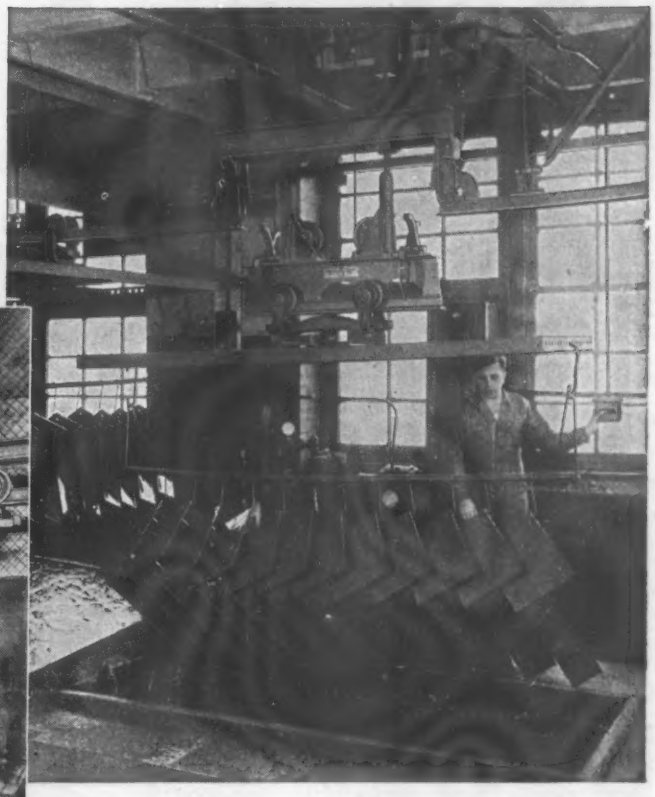
TABLE V—NO. 4 SLAGS OF CALCULATIONS A

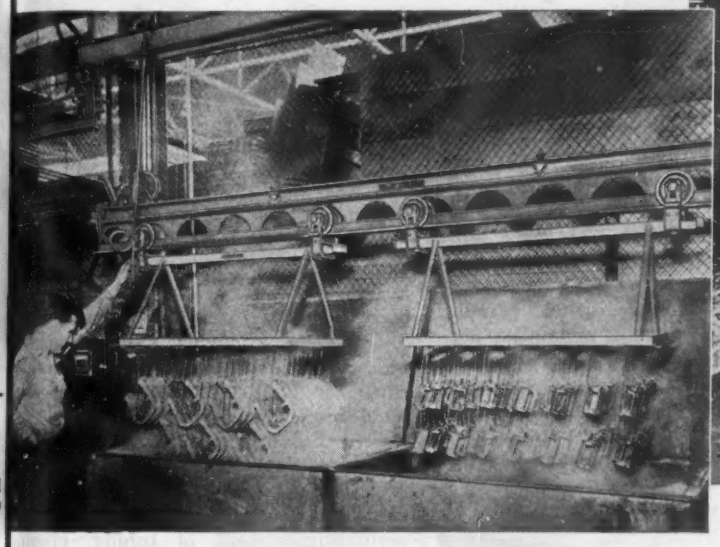
	Table I (3% acid)	Table III (3% basic)
Constituents, %:		
SiO_2	37.00	34.78
Al_2O_3	13.00	12.22
CaO	42.00	44.68
MgO	5.00	5.32
	97.00	97.00
Tetrahedron, No.	6	6
Silicate compounds, %:		
Akermanite	34.82	37.05
Tricalcium disilicate	1.56	29.02
Calcium bisilicate	27.54	.01
Gehlenite	36.04	33.89
	99.96	99.97
Calculated temp., °C	1528	1507
Viscosity—poises	4	3

DROP SECTIONS...

for

DIPPING
CLEANING
PAINTING
PLATING





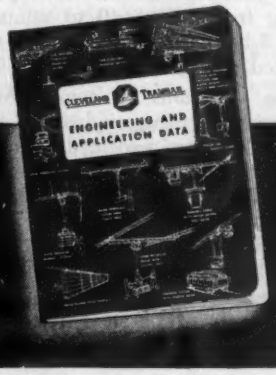
ACCELERATE PRODUCTION by eliminating hand-handling

Mass-production methods are made possible in the dipping, cleaning, painting and plating of parts by the use of Cleveland Tramrail Drop Sections.

Racks loaded with parts can be passed through a sequence of operations such as cleaning, drying, dip painting, dripping, baking, etc., without ever being touched by hand or removed from the Tramrail system.

The carriers with loaded racks are easily conveyed to the drop sections installed over the various tanks. The sections lower the parts into the solutions and elevate them to the original level, permitting the carriers to roll on to the next point.

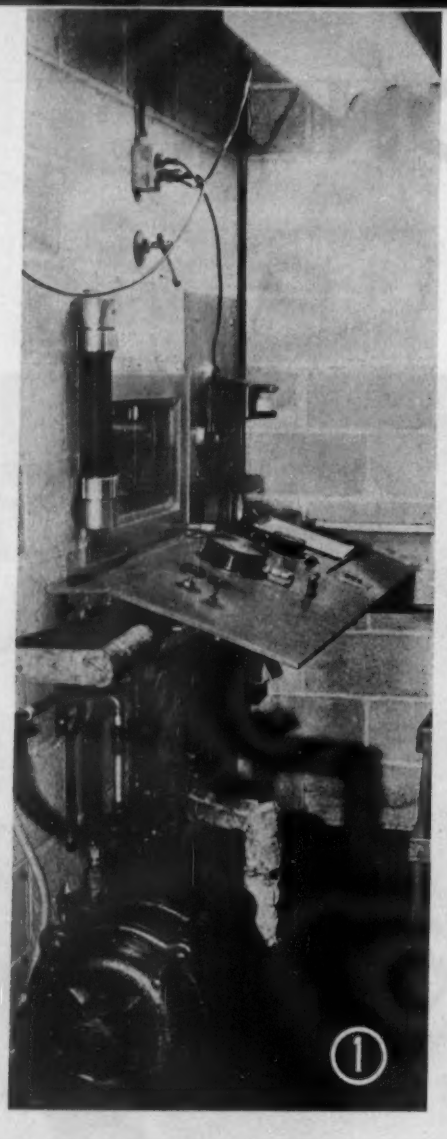
Many companies are eliminating hand-handling, accelerating production and lowering costs with drop sections.



GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT



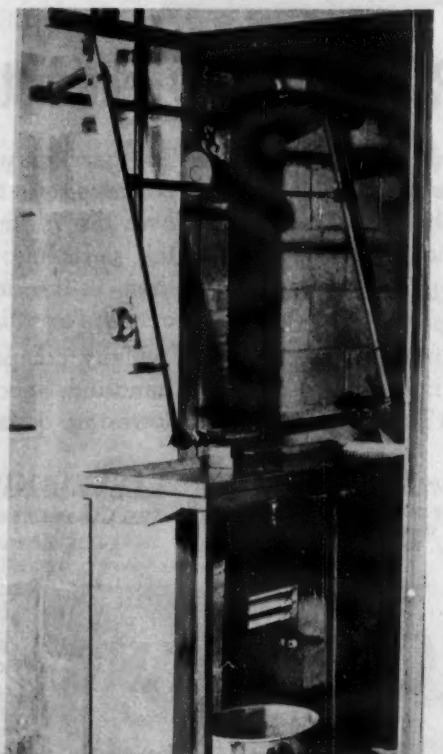
Flame TEST ROOM

. . permits testing of hose under pressure at temperatures up to 2000°F

FLAME resistant, low pressure hose, used during the war on military aircraft to assure operation of the plane for 5 min or more in case of fire, was tested in a special "flame test" room which permits testing of hose and hose connections while operating under pressure at temperatures up to 2000° F. Peacetime use for this installation is anticipated in testing hose for a variety of gasoline and diesel engines, hydraulic brake and control lines, and other purposes.

Typical military specification called for fuel and oil lines forward of aircraft firewall to carry pressures ranging from 15 to 500 psi, and to withstand an open flame having a temperature of 2000 F for 5 min without leakage. This flame resistance enabled pilot to shut off flow of fluid through lines, cutting off fuel for fire.

Flame test room used at Weatherhead Co., Cleveland, affords control from outside panel (Fig. 1) of all test conditions, such as pressure temperature, combustion and flow of oil. Test progress is observed through a small hermetically sealed window having a double thickness of 1/2-in. heat-resistant glass on each side. Main room is built of concrete block and is approximately 12 x 20 ft. Entrance to room has an explosion-proof door. Furnace, shown in Fig. 2, is within an enclosure 6 ft sq. Flame chamber, lined with fire clay, has slot permitting passage of tubing, clamps, etc., to center of chamber. Flame, produced by heated oil under pressure, then is blown entirely around interior to provide heat on all sides of hose. Counterbalance at upper left in photo aids outside control and affords easy manipulation. Furnace enclosure has a cone-shaped metal ceiling and a large independent stack. Another corner of the flame test room is shown in Fig. 3.



Cold Testing

In addition to testing for resistance to flame, extensive cold tests sometimes are made of the flexible hose to meet additional specifications. Procedure usually calls for exposure to temperatures ranging from minus 40 to minus 65°F for a 5-hr period. The hose then is subjected to rigid tests.

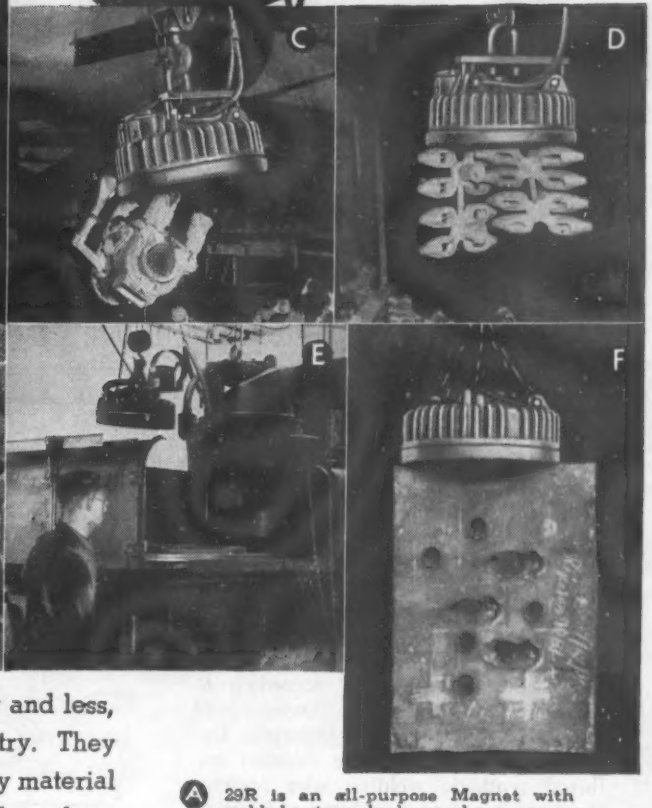
Wide variations in temperature encountered in many industrial installations of hose are expected to be better served by the use of these two testing setups. When used for testing hose or hose connections, the two types of test are flexible enough to be adapted to practically any testing requirement. Units are planned as permanent installations. Apparatus is flexible enough to be adapted to practically any test.

When it's Too HOT...Too HEAVY..

Too SLOW by Hand

an EC&M Magnet gives a LIFT wherever needed

10 CIRCULAR SIZES • A MAGNET FOR *EVERY* CRANE



THESE are small magnets of 29-inch diameter and less, which are designed to do the odd jobs throughout industry. They handle hot castings from the shake-out floor and lift heavy material from floor to machine. Because of their low cost and medium weight, they can be effectively used on industrial crane-trucks to reach into corners, between machines, through narrow aisles—to cover the territory inaccessible to overhead cranes. New Bulletin 904 describes and illustrates this magnet at work. Write for your copy.

- **A** 29R is an all-purpose Magnet with welded outer pole shoe and manganese bottom plate.
- **B** 29-inch diameter Magnet receives 36-volt power directly from crane-truck.
- **C** Handling hot casting as soon as edges cool to become magnetic.
- **D** Annealing and cleaning department speeded up by 29R Magnet.
- **E** 25-inch Magnet lifts heavy die-blanks on and off surface grinder.
- **F** 29R size lifts 1200-lb. pierced armour plate on edge.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

New process developed for making alloy rods by compacting powdered metals around iron wire core

Powdered Metal WELDING RODS

THE USE of powder metallurgy to form machine parts that are difficult or impossible to produce by conventional methods of casting or machinings is well known and quite widely accepted.

Generally speaking, powder metallurgy consists of selecting the desired materials as to chemistry and particle size and pressing the metal grains in a die the exact size of the desired finished piece. The pressures used to make any of the powdered metal compacts vary considerably sometimes exceeding 75,000 psi, depending upon the material used. After compacting, the pieces are sintered in an atmosphere controlled furnace at temperatures approaching the melting temperature of the powder.

Realizing the need in a special alloy welding rod field for wire alloyed of elements difficult to produce by normal rolling and drawing, and the need for a cheaper method of producing stainless steel welding wire, Associated engineers conceived of and developed a method of producing, through the media of powder metallurgy, a rod composed of any desired analysis. The finished rod is capable of being coated with any of the usual alternating current or direct current welding rod fluxes and used in the same manner as any coated, rolled and drawn welding rod, according to a recent report by F. G. Daveler and P. H. Aspen, Associated Industrial Engineers, Philadelphia. The finished unfluxed synthetic welding wire presents the appearance of a welding rod coated with a dark metallic-appearing case. Actually it is a small diameter base wire encased within a cladding of powdered metals.

The base wire is generally made up of that element which will comprise the majority constituent of the finished weld deposit; for instance, in stainless steel the predominant element being iron, the base wire would be iron and the cladding nickel, chromium, manganese, etc. Over the cladding is dipped or extruded a second coating of welding flux, as in the normal production of welding rod, and the rod is ready for use.

Fig. 1 shows the necessary steps for the production of a synthetic welding rod. In making synthetic 19/9 (Type 307) grade of welding wire, a base wire of ingot iron (0.30 per cent carbon) is clad with sufficient powdered low-carbon ferrochrome, pure nickel, ferromanganese and ferrosilicon to combine under the welding arc with the ingot iron base wire to produce a weld deposit of standard Type 307 stainless steel. A 5/32-in. diameter base wire clad to a finished diameter of 0.249-in. will produce such an analysis. Another possibility is a 3/32-in. diameter base wire clad to 5/32; or 7/64-in. diameter base wire clad to 3/16-in. finished diameter. There are endless possibilities available in any conceivable analysis by varying the quantity of cladding to the quantity of base metal. The maximum chrome nickel content thus far achieved, without exceeding a workable finished diameter has been the 25/20 grade of heat-resistant alloy.

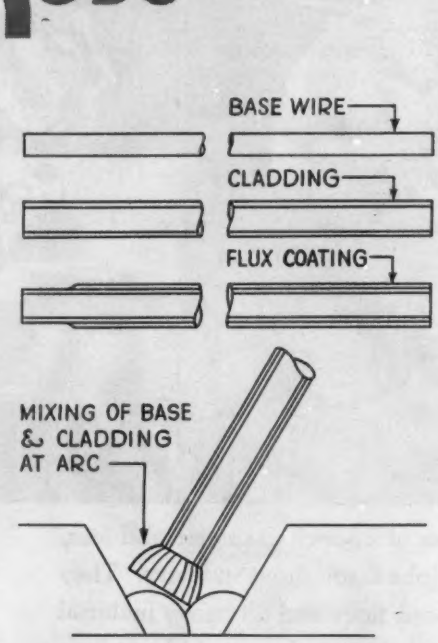


Fig. 1—Various steps or stages in production of synthetic welding rod by powder metallurgy methods as described here. Data and illustration taken from "The Welding Journal"

Many additional standard analyses (stainless, tool steel, corrosion resistant, hard-facing grades, etc., have been produced. Variations from the standard analysis have been obtained by varying the ratio of base material to cladding material, or, which is more important, by varying the density of the cladding.

The density may be varied from 5 per cent of drawn steel density to 8 per cent of drawn steel density by varying the pressure exerted on the powdered metal compact around the base wire. Another method of altering the density of the cladding is to vary the quantity of filler used to fill in the voids between the powdered metal particles. This brings us to the most important item in this report, the method of producing synthetic welding rod core wire.

Early attempts at getting the powdered metals to adhere to the base wire and to form a smooth even case were alternately discouraging and heartening. Equipment was make-shift and to add to other difficulties few of the rules for producing normal powdered metal compacts were applicable.

Most of the first test rods were made by pressing the metal powders around short lengths of mild steel wire by the use of a steel die similar to that shown in Fig. 2 in which the base wire passed through the piston while the powders were being compressed. The results from this method of production were only fair, particularly in view of the fact that the process was slow and the yield low. It did serve, however, to lay the groundwork for determining particle-size requirement, sintering characteristics and weldability of the finished product.

It took many months of concerted effort to find that the metal powders, if properly selected for particle size and mixed with a suitable filler and bonding material, could be readily extruded much the same as welding rod fluxes are now extruded on drawn welding wire. Next the proper filler and binder had to be found, a filler which would not alter the welding characteristics, and a binder which, if organic, would volatilize out of the compact at some point below the sintering temperature to prevent excessive carbon pickup during welding.

Sintering: Many lubricants were tested in order to find the mixture that produced the two essential features desired; that of aiding material flow during extruding and that of allowing the low-temperature sintering to take effect.

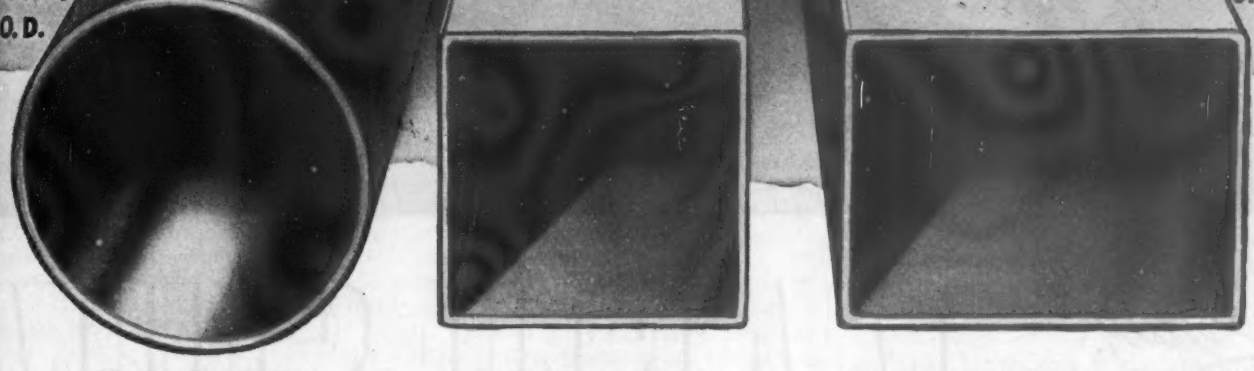
The original sintering cycles were long and at relatively high temperatures, but experience showed us that thorough sintering, as considered in the manufacture of powdered metal machine parts, was not necessary, and that synthetic welding wire required just sufficient bond to give the rod strength and durability to withstand normal abuse. This brought the process down to a very

WORKABILITY

You can do so much with Michigan Welded Steel Tubing

SIZES 1/4" to 4" O.D.

GAUGES 9 to 22



ROUND • SQUARE • RECTANGULAR and SPECIAL SHAPES

Michigan welded steel tube can be flanged, expanded, cold drawn, fluted, flattened, bent, coiled, upset, beaded, grooved, rolled, spun, threaded, tapered, and shaped to meet every manufacturing demand. •Available in commercial mill lengths or cut to specified lengths, shaped and fabricated, ready for assembly.

Engineering advice and technical help in the selection of tubing best suited to meet your needs.

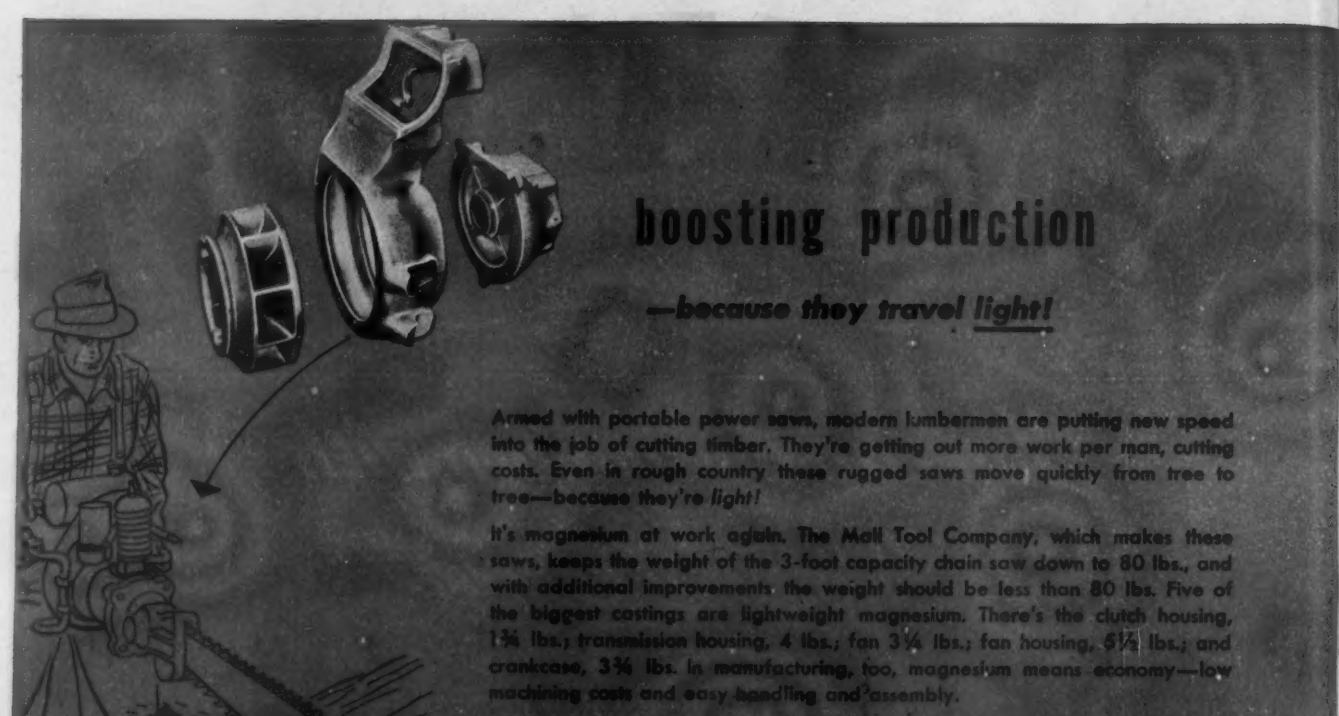
Michigan STEEL TUBE PRODUCTS COMPANY

MORE THAN 25 YEARS IN THE BUSINESS

9450 Buffalo St. • Detroit 12 • Michigan

FACTORIES: DETROIT, MICHIGAN and SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee and Minneapolis — Miller Steel Co., Inc., Hillside, N. J. — C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—C. A. Russell, Inc., Houston, Texas—Drummond, McCall & Co., Ltd., Toronto, Canada.



boosting production

—because they travel light!

Armed with portable power saws, modern lumbermen are putting new speed into the job of cutting timber. They're getting out more work per man, cutting costs. Even in rough country these rugged saws move quickly from tree to tree—because they're *light!*

It's magnesium at work again. The Mall Tool Company, which makes these saws, keeps the weight of the 3-foot capacity chain saw down to 80 lbs., and with additional improvements the weight should be less than 80 lbs. Five of the biggest castings are lightweight magnesium. There's the clutch housing, 1¾ lbs.; transmission housing, 4 lbs.; fan 3¼ lbs.; fan housing, 5½ lbs.; and crankcase, 3¾ lbs. In manufacturing, too, magnesium means economy—low machining costs and easy handling and assembly.

Look to magnesium for better products of many kinds. For competent engineering aid, consult the nearest Dow office.

Ready...
to make products move!

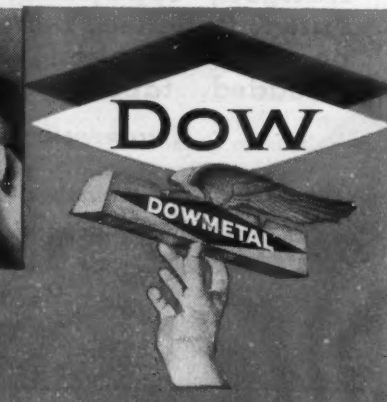
MAGNESIUM

LIGHTEST OF ALL STRUCTURAL METALS

A plentiful supply of magnesium is now readily available from Dow, the pioneer producer and leading fabricator for nearly 30 years.

Backed by continuous Dow research, standard fabrication methods and shop techniques are used by modern plants in all parts of the country.

This magnesium griddle is one of the many consumer items and industrial products now being manufactured of magnesium alloys.



MAGNESIUM DIVISION • THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

economical low-temperature short cycle operation.

Oxidation of the cladding during the baking and hardening treatment required the use of controlled hydrogen atmosphere in the furnace.

Hydraulic pressures exceeding the normal pressures used in extruding welding rod coatings are necessary to extrude powdered metals with sufficient finished density to allow sintering and to prevent the flaking off of the cladding during welding. This requires the use of special dies and hydraulic presses built for pressures up to 18,000 psi on the metallic mix, although satisfactory results were obtained at 9000 psi pressures.

Flux Coatings: After welding tests were made on the first samples produced, it appeared that a special flux formula would be necessary to overcome some of the unorthodox welding characteristics of the synthetic wire. This premise was soon discounted as the finished synthetic rod approached the physical and welding characteristics of drawn steel. Numerous alternating current-direct current and straight direct current fluxes of the lime or titanium dioxide type were tried, some titanium being dipped on the rod and some being extruded, with results indicating that the same fluxes used on drawn wire may be used on synthetic wire.

With the chromium particles clad on the outside of the basic wire, in the stainless steel grades, a tendency toward losing some of the chromium in the weld deposit due to oxidation during welding was expected. Insofar as tests are able to detect, this has not exceeded the normal loss from drawn wire.

Thorough mixing of the base wire with the cladding during the actual welding has been questioned repeatedly, but constant checking of chemical analysis of various weld deposits and metallographic studies of weld metal have proved that thorough mixing is apparent.

One peculiar property which has caused comment is the fact that the magnetic rod (due to the mild steel base wire and ferroalloys) will produce a nonmagnetic austenitic weld deposit of a quality equal to a deposit made by a drawn stainless steel welding rod.

Costs: Close quality control of powder metal analysis, particle size, mixing and formulating, and extruding pressures are necessary to enable us to produce synthetic wire which will give consistent weld deposits. This extra cost of quality control is offset by the relatively low cost of producing the standard stainless steel grades of welding wire. The finished cost of synthetic welding rod core wire in sizes ranging from 1/4 x 14 in. to 5/32 x 14 in. varies from two-thirds to three-fourths of the cost of mill-rolled and drawn wire. This is wire completely processed, cut to 14 in. length and ready for flux coating.

Tolerance on finished diameters can be maintained to plus or minus 0.002-in., depending upon the shop practice for replacing worn coating dies. The base wire is, of course, cut to length before the cladding is extruded on the wire and this controls the length tolerance of the finished rod.

COSTS PER 100 LB

	5/32 In.	1/4 In.
Ingot iron wire cut to length	$5.50	$5.40
Powdered metal alloys	17.00	17.00
Filler and binder	1.25	1.25
Extruding and powder handling labor	4.00	2.70
Heat treating	2.00	1.40
Quality control	1.10	1.00
	$30.85	$28.75
Cost of mill-drawn 19/9 wire/100 lb	$41.00	$33.00

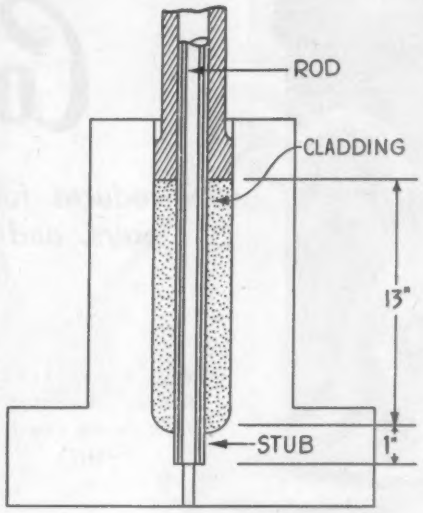


Fig. 2 — Tooling setup for compressing powdered metal onto base wire

To illustrate the cost comparison between mill-rolled and drawn stainless wire and synthetic welding wire, a cost analysis for two sizes of wire is outlined in the accompanying table.

The prices given in the table refer to quantities of 10,000 lb or more. The itemized prices for the synthetic wire are not hypothetical but are the costs recorded for small production runs, and the open market prices for such items as iron wire, powdered metal, commercial heat treating, etc.

Future Enterprise: Any metal which is powdered can be extruded on any iron, steel, alloy or pure element base wire. Considerable research has been done on combining molybdenum and tungsten powders with nickel-chrome base wire to produce alloys for special purpose welding.

Much thought has been given lately to special alloys for strength at high temperature and such other qualities as demanded for use on turbosuperchargers, rockets, jet propulsion, etc., and since the synthetic welding wire is quickly, cheaply and readily altered as to analysis, the process herein outlined will have its place in producing welding rod for those exacting requirements.

One phase of the development of particular significance is the experience and knowledge gained in extruding powdered metal compacts with sufficient density to allow sintering after extruding.

It is felt that this feature, plus the ability to clad basic metal parts with alloys, will open the door to many new applications for powder metallurgy outside of the welding electrode field.

Tool Room Wheels Feature New Bond

Macklin Co., Jackson, Mich., announces, through a booklet on "Tool Room Wheels", two new bonds, V5 and V6. Considered to be a distinct improvement in tool room grinding wheels, the bonds are the result of long scientific research, and actual tests in industrial concerns. Produced in many structures, or degrees of porosity, tool room wheels with the new bond are available for all types of tool room grinding.

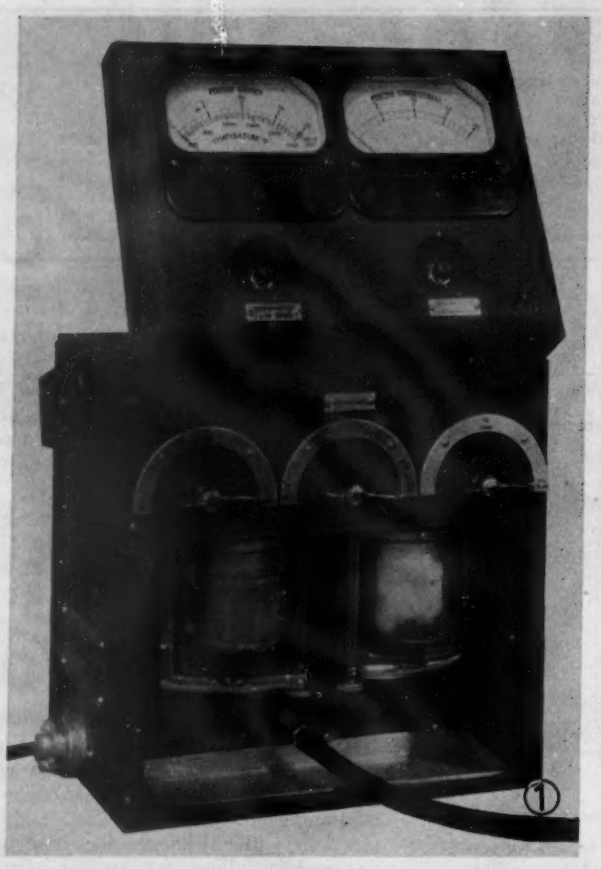
The booklet offered by the company gives complete information on the development of the new bonds, as well as complete specifications for each type of tool room grinding and surface grinding jobs.

Company Has Long History

A brochure outlining the history of Allied Products Corp., Detroit, producer of standard and interchangeable tools and parts, describes its work in the automotive industry, its war service and its present position as a supplier to the radio, home appliance, plastics, aviation, furniture, electrical and other industries.

Genesis of Allied Products Corp. was the Richard Brothers plant in Detroit, founded in 1915. This plant originally contained only 5000 sq ft, which has grown to 79,000 sq ft. Company's Victor-Peninsular plant was founded in Detroit in 1917, and its two plants in Hillsdale were founded in 1926 and 1935, increasing size to approximately 275,000 sq ft.

Brochure shows interiors of company's four plants and machines for manufacturing tools, dies, jigs, fixtures, plastic molds, hardening and precision ground parts; cold forged parts, bolts, cap screws and special production tools. The R-B interchangeable punch and die, originally perfected by Richard Brothers, is featured and its use and functions explained by "cut-away" drawings and by photographs of many types of punch points and special shapes.



Combustion Control

reduces fuel costs, furnace repairs, and insures uniformity of the product

Fig. 1—Cities Service industrial Heat Prover (model MH)

FUEL COSTS are reduced, repairs and replacements such as those due to flame corrosion on furnace linings, crucibles and refractories are less frequent and less expensive with accurate combustion control. Because of exact control of oxidation-reduction conditions in the furnace, more uniform products are turned out and production as a whole is stepped up.

These basic advantages are fully recognized by management and operators alike; among larger steel plants a very substantial proportion of the total investment is frequently allocated for control of combustion by instruments. In smaller plants, however, several factors may interfere with such a program. Precision instruments of this type are expensive to purchase. Maintenance of accuracy and general upkeep demand money, time, and an experienced engineering staff. As a result, most plants do not have an adequate solution for their combustion problems.

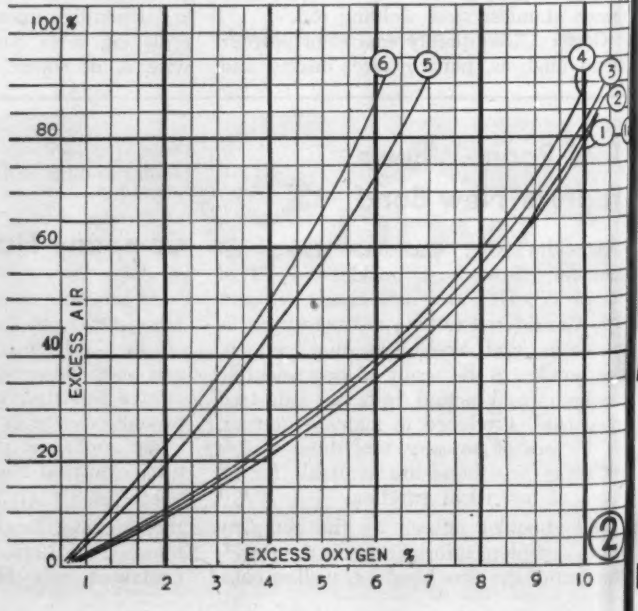
Recognition of this fact has led the Cities Service Oil Co. to adopt the policy of providing complete combustion control service, without charge, to its customers. The instrument used is the Cities Service Heat Prover. This is not sold to any customer; it is either supplied for periodic checks or is permanently installed without cost to customers for its upkeep. Interpretation of readings and advice on the practical use of these readings are furnished by the engineering staff of Cities Service.

This service has been adopted for open hearths, soaking pits, heating furnaces, steam power plants, and internal combustion engines. It has been widely used for gasoline, diesel and natural gas engines.

Three methods have been generally available for combustion analysis. The first of these consists of a straightforward chemical analysis of the products of combustion and residual gases. Ordinarily the traditional Orsat apparatus is used. In this, a sample of the gases is drawn into a burette, and the various components absorbed individually by a series of specific absorbents. The corresponding volume decrease measured the amount of each gas in the mixture. Too often, in order to eliminate most of the elaborate

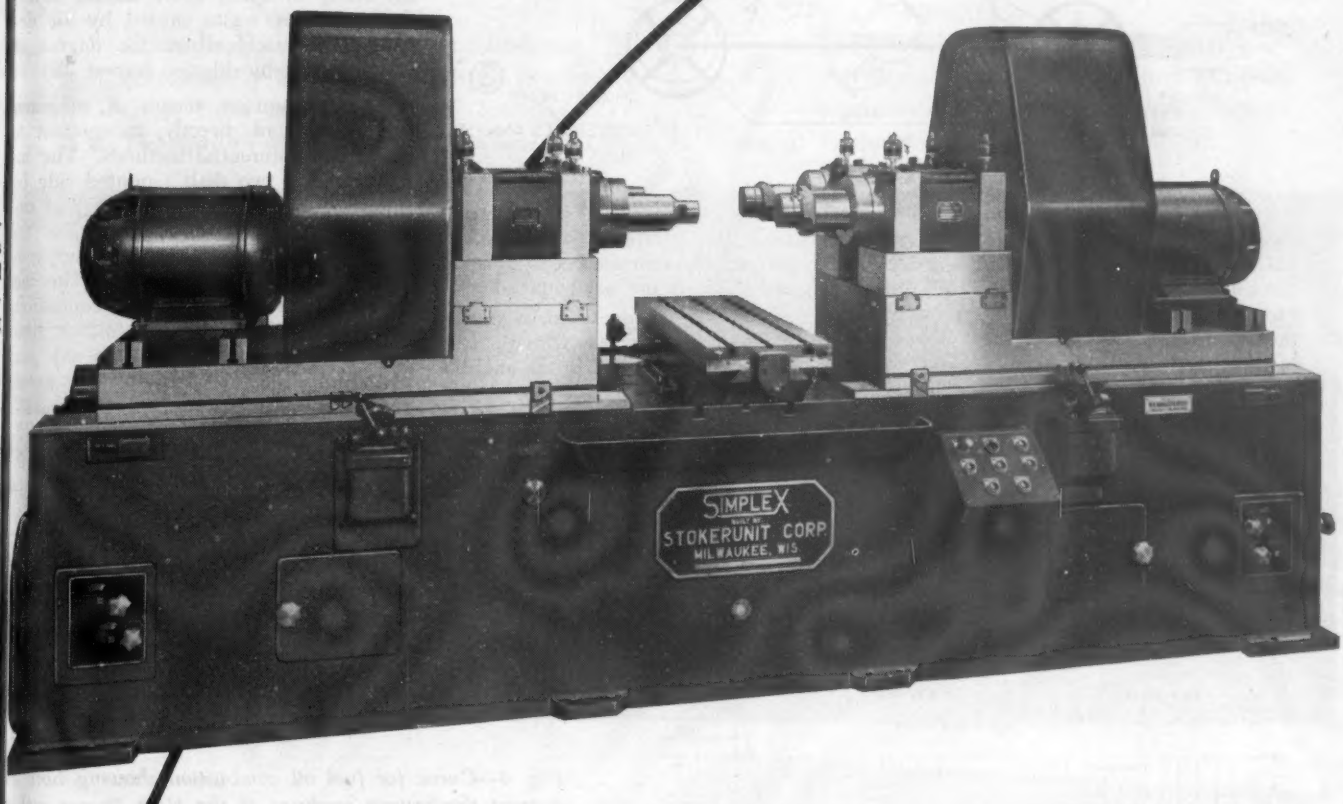
Fig. 2—Curves used for converting per cent of excess oxygen to excess air for typical fuels encountered in industry—fuel oil, bituminous coal, natural gas, producer gas, coke oven gas and blast furnace gas

	● Coke Oven G. ①	Coke Oven G. ●1a	● Natural Gas ②	● Fuel Oil ③	Bituminous Coal ④	● Producer Gas ⑤	● Blast Furn.G. ⑥
	●Averages in Pittsburgh Area						
PARTS OF	VOL.	VOL.	VOL.	W	W	VOL.	VOL.
C	–	–	–	.86	.736	–	–
CO	.054	.060	–	–	–	.260	.260
H_2	.546	.500		.11	.053	.0995	.020
CH_4	.287	.360	.829	–	–	–	–
C_2H_2	.032	–	–	–	–	–	–
C_2H_4	–	.040	–	–	–	–	–
C_2H_6	.008	–	.149	–	–	–	–
S	.006	–	–	.008	.0075	–	–
O_2	.004	.005	–	.010	.100	.009	–
CO_2	.014	.015	–	–	–	.035	13
N_2	.049	.020	.022	.002	.017	.5965	.59
MOIST H_2O	–	–	–	.010	.006	–	–
ASH	–	–	–	–	.0805	–	–
THEOR. AIR	4.747	5.360	10.4775	13.724	9.9428	.821	.6727
*DRY PROD.	4.250	4.780	9.477	13.724	10.4998	1.5417	1.5127



SIMPLEX

Increasing wage rates of today make necessary new methods of reducing costs. At medium production rates, this becomes difficult with general purpose machine tools. Simple multiple tooling and fixtures, indexing from roughing to finishing position, offer a new cost reduction method. Tooling costs are low — job possibilities endless.



This photograph shows a SIMPLEX 4U 2-way Precision Boring Machine equipped with four #4 spindles and a hydraulically indexed sliding table operating between adjustable positive stops. On the sliding base a single work holding fixture is mounted providing for operating on the work from both ends. After the roughing operation is completed on both ends, the table is indexed to the finishing position, the finishing operations are performed on both ends simultaneously and the completed job is ready to remove from the fixture to change to the next job. The fixture and tools are removed and retained intact, ready for a quick set-up when the job is again run. The automatic cycle relieves the operator and helps maintain predetermined production schedules.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Machine Tools Division

4532 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

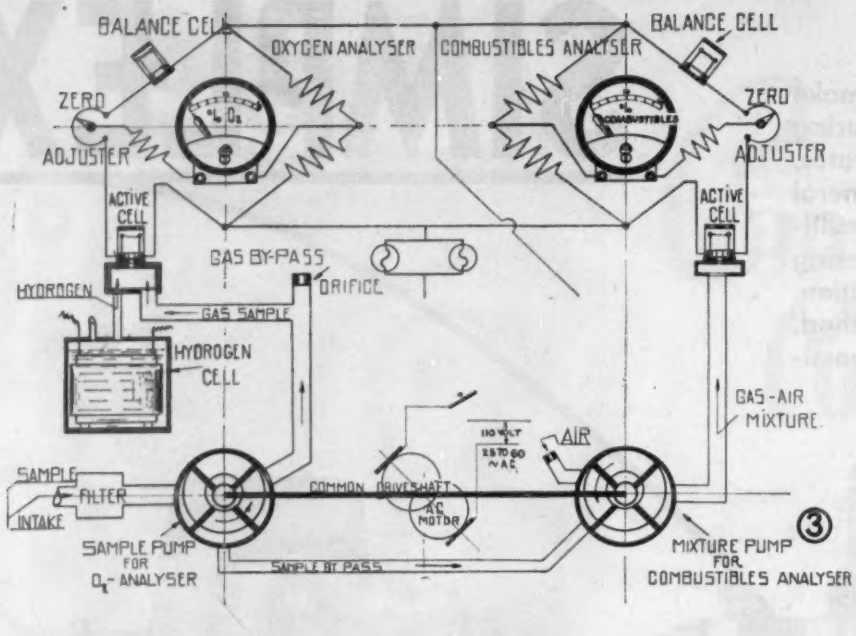


Fig. 3—Schematic diagram of model MH

chemical manipulation, the Orsat method has been reduced to a carbon dioxide determination—insufficient in itself to give more than a general indication of the combustion process.

The other two procedures depend on purely physical properties. The better known is the mechanical-fan method. This depends upon the fact that a current of heavy gas, such as carbon dioxide will cause a free fan to spin more rapidly than in the case of a lighter gas such as atmospheric air. Although mechanically sound, the interpretation of the results, particularly with respect to possible unburned gases is not easily possible.

Gases can also be identified by means of heat conductivity measurements. This principle has been applied to the analysis of flue gases with some success. A hot wire will be cooled by various gases in proportion to their heat conductivities. This relative lowering in temperature is easily measured electrically by noting the corresponding decrease in resistance of the wire. However, since some unburned hydrocarbons may have almost the same heat conductivity as air, the method has obvious limitations.

Description

In developing the combustion analyzer, the research staff kept in mind the desirability of a direct attack on the problem. It is evident that any heating equipment or heat engine operates most efficiently when just enough air is supplied to burn all the fuel completely. The analyzer is based on the fact that the study of spent gases should reveal the degree of waste caused by air deficiency (excess fuel), or the degree of waste caused by dilution (excess air).

Through unique means it measures these conditions directly, in contrast to the earlier inferential methods. The instrument has two dials mounted side by side; one indicates the percentage of unused combustibles and the other the percentage of excess oxygen which may be present in the spent gases. The fact that these direct readings are continuous and can be made at any instant from combustion samples taken from any part of the furnace, flue or exhaust, has greatly extended its usefulness.

The industrial heat prover is a portable instrument weighing approximately 25 lb. Its equipment includes a sample tip, a 50 ft hose and a thermocouple for temperature measurement. It operates electrically on alternating current, 25 or 60 cycle, and on 110 or 120 v current.

It is convenient to consider the instrument in two parts (see Fig. 3). One section of the instrument is designed to measure the unburned fuel. This

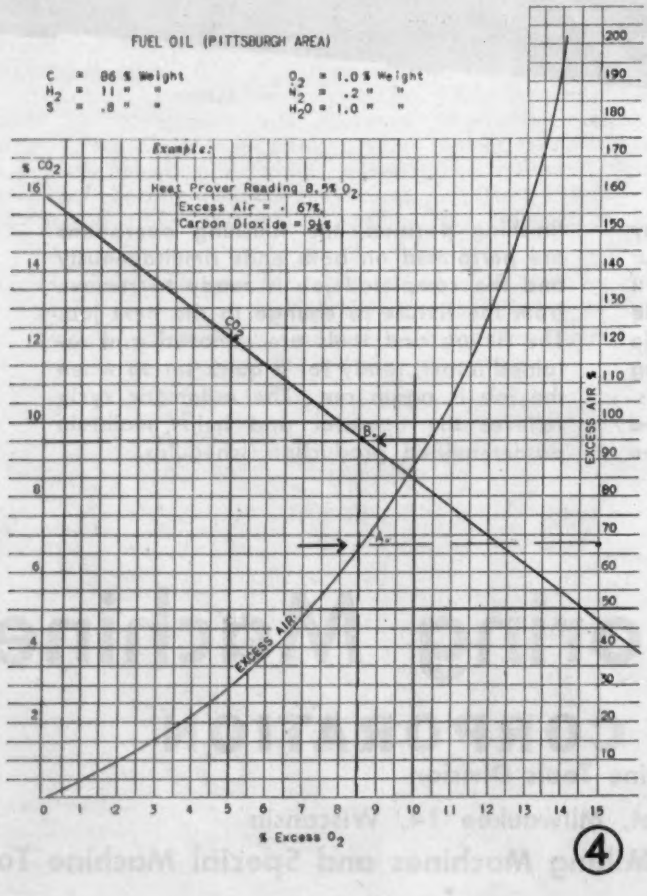
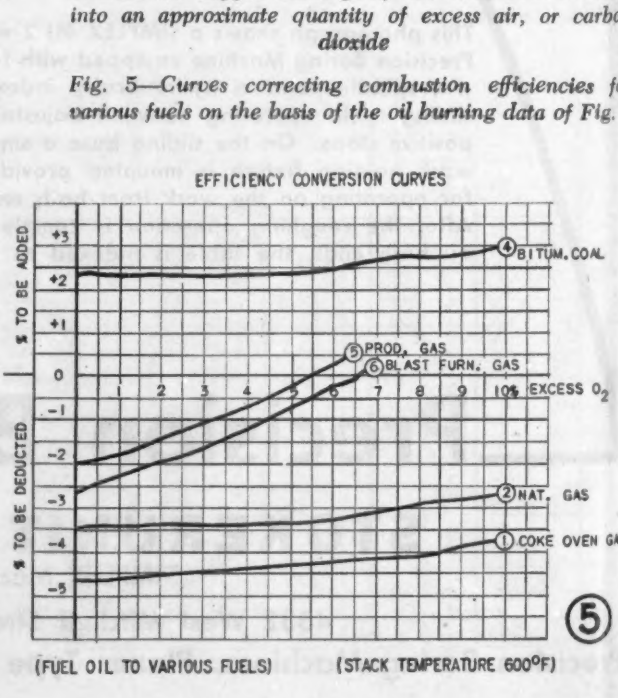


Fig. 4—Curve for fuel oil combustion showing how to convert the oxygen readings of the Heat Prover either into an approximate quantity of excess air, or carbon dioxide

Fig. 5—Curves correcting combustion efficiencies for various fuels on the basis of the oil burning data of Fig. 2

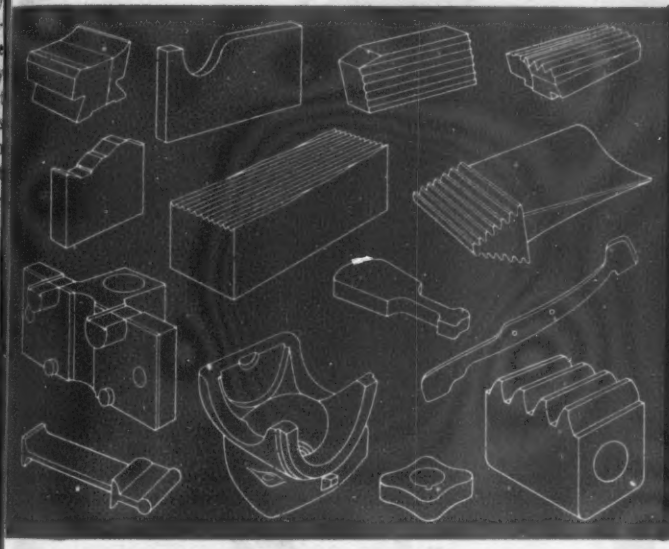


Important Message

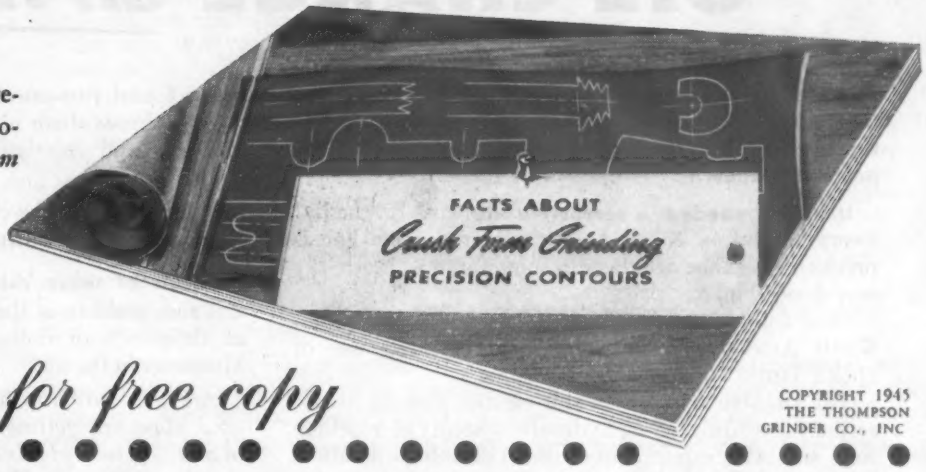
to all interested in production of precision flat form contours

1. Contours like these can be produced more economically and accurately by a proven crush form grinding process known as *Thompson Truforming.* (REGISTERED TRADEMARK)

2. The ONLY machine that is *completely engineered and built* for crush form grinding precision contours is the new *Thompson Truform Grinder.*



3. To meet individual requirements, various types of automatic *Thompson Truform Grinders* are available. For advantages and complete pictorial production explanation send for this new book.



Send coupon for free copy

COPYRIGHT 1945
THE THOMPSON
GRINDER CO., INC

CRUSH FORM CONTOUR GRINDING DEVELOPMENT LABORATORY

The Thompson Grinder Co., Inc., Dept. 13, Springfield, Ohio

Gentlemen: Please send me your new 16 page pictorial book describing Thompson Truforming (Crush Form Grinding on Surface Grinders).

*Name*_____ *Position*_____

*Company*_____ *Address*_____

*City*_____ *Zone*____ *State*_____

NORTH AMERICAN AVIATION, INC., big name in the industry, changed to Shell Industrial Lubricants and solved a serious rusting problem in 30,000 pieces of producing equipment—without loss of production time!

OIL CHANGE *on the Fly*

At North American Aviation, Inc., RUST was "termiteing" 30,000 pieces of producing equipment vital in turning out P-51 Mustangs and other equally important planes.

Urgently needed: a corrective—to work on the fly! Every second on North American's production line is precious—balance of power in some faraway battle-sky may depend on it.

Shell Lubrication Engineers—called in to work with North American technicians—recommended use of Shell's Turbo Cleaner.

The suitable viscosity of this cleaner permits its use as the lubricating oil in hydraulic systems of machine tools and other equipment during a cleaning operation. With this double-feature oil, North American lost *not a single minute* of valuable production time.

Cleaning completed, three grades of high-quality Shell Tellus Oils were then used. These oils possess rarely found rust-preventive qualities. Unusual "wettability" prods them into penetrating rusted surfaces—loosening and dislodging particles of scale.

Shell Engineers also recommended coating machine areas above the oil level with Shell Ensis Oil. This protects metal from moisture in the air . . .

Result of these changes: complete elimination of this rust problem at the North American plant . . . tens of thousands of dollars saved . . . *more* fighting-mad Mustangs in the air.

Are you sure the machines in your plant are getting the benefit of all that's new in lubrication as it develops? Contact Shell Oil Co., Incorporated, 50 W. 50th St., New York 20, N. Y., or 100 Bush St., San Francisco 6, Cal.

SHELL

SHELL TELLUS OILS

consists essentially of a catalytically-active heated platinum wire which forms one arm of a wheatstone bridge circuit. A sample of the spent gases is drawn into the apparatus by means of a small rotary pump, mixed with air, and passed over the hot wire. If the sample contains any unburned fuel the mixture will burn on the surface of the hot platinum wire and thereby increase its temperature and electrical resistance. This throws the circuit out of balance and a reading will register on the combustibles meter. The meter is calibrated directly in terms of "per cent combustibles" instead of the usual electrical units.

The other portion of the apparatus is used to measure the oxygen content of the spent gases. It contains a duplicate of the hot wire circuit described above. In this case, however, the sample gases are mixed with hydrogen before passing the mixture over the platinum wire catalyzer. Any oxygen present will combine, burn with the hydrogen and increase the temperature of the wire as before. The meter which is connected with this circuit is calibrated directly in "per cent oxygen". For added convenience the lower portion of the scale is further arranged to indicate the stack or exhaust temperatures in degrees Fahrenheit. The motor driven pump, hydrogen generator and all equipment form an integral unit, and all operations are entirely automatic.

To insure accuracy, meter readings are frequently verified by trained operators with bottled gases of known composition.

Metallurgical Applications

One of the most important applications of this instrument is in metallurgical processes. These industries are enormous consumers of fuel and fuel economies are correspondingly important. In fact, it is interesting to note that open hearth steel plants are among the largest users of the analyzer. There are two features which make it particularly desirable in metallurgy.

First, with the aid of this instrument, it is a simple matter to explore in detail any part of the furnace atmosphere. Second, dials show an immediate and direct response to changing conditions of oxidizing or reducing atmospheres. It is known that a slightly excess of oxygen, even 1 per cent, creates an oxidizing condition, whereas a 1 per cent excess of combustibles would provide a reducing atmosphere.

Waste, then, may be caused either by excess air or by excess fuel, or, in exceptional cases, by both. Readings of each factor at the same time, permit precise analysis and prompt correction of waste.

A furnace with a neutral atmosphere, for example, was found to consume 5,000 cu ft of natural gas per hour. An ideal reading for such a furnace would be zero per cent excess oxygen and 1½ to 2 per cent combustibles. (For an oxidizing furnace 1 per cent excess oxygen and zero per cent combustibles would be ideal.)

TABLE I

OIL BURNER EFFICIENCY

(No Combustibles)

Temperature F°	PER CENT EXCESS AIR							
	0	20	40	60	80	100	120	140
200	90.5	90.0	89.5	89.0	88.5	88.0	87.5	87.0
250	89.5	88.8	88.1	87.5	86.8	86.1	85.5	84.8
300	88.5	87.6	86.8	85.9	85.1	84.2	83.4	82.5
350	87.4	86.4	85.4	84.4	83.3	82.3	81.3	80.2
400	86.4	85.2	84.0	82.8	81.6	80.3	79.1	77.9
450	85.4	84.0	82.6	81.2	79.8	78.4	77.0	75.6
500	84.3	82.8	81.2	79.6	78.0	76.5	74.9	73.3
550	83.3	81.5	79.8	78.0	76.3	74.5	72.8	71.0
600	82.2	80.3	78.4	76.4	74.5	72.6	70.6	68.7
650	81.2	79.1	76.9	74.8	72.7	70.6	68.5	66.4
700	80.1	77.8	75.5	73.2	70.9	68.6	66.3	64.0
750	79.0	76.6	74.1	71.6	69.1	66.6	64.2	61.7
800	78.0	75.3	72.6	70.0	67.3	64.7	62.0	59.3
850	76.9	74.0	71.2	68.4	65.5	62.7	59.8	57.0
900	75.8	72.8	69.8	66.7	63.7	60.7	57.7	54.6
950	74.7	71.5	68.3	65.1	61.9	58.7	55.5	52.3
1000	73.6	70.3	66.9	63.5	60.1	56.7	53.3	49.9
1050	72.6	69.0	65.4	61.8	58.3	54.7	51.1	47.5
1100	71.5	67.7	63.9	60.2	56.4	52.7	48.9	45.1
	Loss Due to 1% Combustibles*							
	4.6	5.6	6.6	7.7	8.7	9.7	10.7	11.8

Table for rapid interpretation of steam boiler efficiency in the combustion of oil, also it shows loss caused by presence of 1% combustibles in the stack, over the entire range of temperatures and excess air content.

* To get net efficiency, multiply per cent combustibles by loss due to 1 per cent combustibles corresponding to excess air and subtract the answer from the efficiency for no combustibles corresponding to temperature.

Example: Excess Air —40%, Combustibles —0.5%, Stack Temperature 800° Fahrenheit; Net Efficiency — 72.6 — (0.5 x 6.6) = 69.3%.

The readings actually secured on this furnace were:

Excess Oxygen ..... ½% (2% Excess Air)
Combustibles 4%
Stack Temperature .... 2000° F

Calculations based on curves of the type reproduced here revealed that there was an avoidable loss in this furnace of approximately 10 per cent of gas per hour. Since the furnace consumed about 12,000,000 cu ft annually in 300 eight-hour working days, elimination of this 10 per cent loss meant a saving of 1,200,000 cu ft. At a rate of 35 cents for each 1000 cu ft this amounted to $420 annually on this single furnace.

The reduction of large amounts of excess air can also produce gratifying results. In a straight heating furnace, for instance, fired with fuel oil and consuming 30,000 gal annually, these initial readings were obtained:

Excess Oxygen ..... 7 % (47% Excess Air)
Stack Temperature .... 1450° F

After adjustment these readings were secured:

Excess Oxygen ..... 3 % (15% Excess Air)
Stack Temperature .... 1450° F

By discovering this high percentage of excess air and reducing it as low as operating conditions permitted, a 24.4 per cent of 7330 gal per year, fuel savings was realized.

In an average small-size industrial city a survey was made on fuel-saving opportunities. In 23 representative industries, it was found that the sum of $18,578 could be saved by the use of this instrument out of a total fuel cost of $430,700, or an over-all reduction of about 4 per cent. The complete survey findings are given in the table Value to Industries.

The instrument has been thoroughly tested on every type of combustion in this country and with every type of fuel known. Though this is not the place to give details on wartime developments, it can be stated, however, that these include a special adaptation of the instrument for the detection of hydrogen in submarines; also, a special installation for the control of catalytic cracking in the huge Tutwiler refinery built for war production by Cities Service at Lake Charles, La. In the National Fuel Efficiency Program of the U.S. Department of the Interior and the Bureau of Mines, the heat prover has played and is still playing an important role.

TABLE II

VALUE TO INDUSTRIES

Company	Heat Prover O_2	Heat Prover Fuel	Per Cent Savings	Fuel Cost	Fuel Savings
1	1%	2%	10	$ 3,000	$ 300
2	1	0	..	1,000	...
3	10	0	5	100,000	5,000
4	7	0	2	3,600	80
5	10	0	5	14,000	700
6	10	0	5	4,200	210
7	7	0	2	8,400	168
8	9	0	4	15,400	616
9	10	0	5	14,400	720
10	5½	0	¼	10,000	50
11	9	0	4	24,000	960
12	9	0	4	4,000	160
13	6	0	1	10,000	100
14	1	0	..	10,000	...
15	7	0	2	3,200	64
16	4/5	½	2½	100,000	2,500
17	3	0	..	7,500	...
18	10	0	5	27,000	1,350
19	½	2	10	7,000	700
20	0	8	30	6,000	2,000
21	10	0	5	8,000	400
22	10	0	5	48,000	2,400
23	5	1	5	2,000	100
	Total			$430,700	$18,578

DRAWN FOR JONES & LAUGHLIN STEEL CORPORATION BY ORISON MACPHERSON

JALLOY STEEL

NEW, TOUGH, DUCTILE, DURABLE, DEVELOPED FOR DYNAMIC JOBS

Jalloy is a *new* steel developed by J & L for application where dynamic forces are involved in the job to be done. It was evolved from a steel produced to take hard knocks and rough usage in the deep-drilling operations of the petroleum industry. In the war emergency this steel, through intensified research, was adapted quickly to tank armor . . . . and you know how magnificently U. S. tanks withstood terrific punishment in the victorious campaigns of Africa, Europe and the Pacific.

Where steel must be in action, where it has to meet stresses, heavy shocks, and resist the forces of abrasion and weather — there Jalloy, the tank armor veteran, looms serviceably for you on the industrial horizon.

Although a giant for strength, Jalloy is ductile and tough. It makes possible radical changes in design affording very substantial reductions in weight of many products. Its welding, forming and forging qualities are excellent. It responds to heat treatment with exceptional uniformity of physical properties—it performs well even at sub-zero temperatures.

Jalloy is a working steel; a steel for use with power and action on the big, tough, dynamic jobs that must be done in America soon and fast.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

J&L STEEL

LIGHTER, STRONGER, CONTROLLED QUALITY STEELS

COPYRIGHT 1945. JONES & LAUGHLIN STEEL CORPORATION

A WORKING STEEL

Plow shares of tank armor, instead of swords, are modern symbol of reconversion of steel from war to peace. Jalloy, produced on the famous J&L formula for tank armor, is a hard-working new steel being adopted by plow makers for its toughness, durability and workability. Farming today calls for tractor-operated plows that can turn as many as 5 furrows at a time (see sketch).

Ordnance for Revolution produced by iron works in Colonies consisted primarily of cast iron cannon and cannon balls.

Powerful blades of bulldozers building new highways, leveling land for new municipal airports, grading for great irrigation and flood control projects are being made of the tough, unbeatable J&L steel called Jalloy.

Alloy steel process discovered by Michael Faraday (England, 1791-1867), waited 50 years for practical application until Sir Robert A. Hadfield invented manganese steel, adding great toughness and strength to alloy and carbon steels, when heat treated.

Before steel, the opening of highways, erection of bridges and buildings, development of oil, lumber and other resources were small, local enterprises. Only after steel became available in abundance in America in the 1890's did such projects become possible on today's vast, nation-wide scale.

Mt. Hope iron ore mine in New Jersey, first operated in 1715, is still producing.

Heat treated plates from Jalloy are used in abrasion resisting applications where its longer life reduces maintenance costs.

Crucible steel was invented 1730 in England by Benjamin Huntsman.

Heavy duty shafting must withstand repeated shocks and stresses. Jalloy steel has the high physical and impact strength for such jobs.

Big steam shovel buckets that can dig up truckload of earth and rock in one bite must be made of toughest, hardest-wearing alloy steel, such as Jalloy.

Open hearth furnace, greatest producer of steel in large tonnages at low cost, was invented in England, 1861, by C. W. Siemens.

Today steel is years ahead in metallurgical research and development. Satisfying the steel-hungry public; putting steel to work in new ways—this is the job today that spells employment, progress and enjoyment of living on a new, high level of convenience and contentment.

Benedict Arnold dug Adirondack iron ore in 1775 to get iron for cannon, chains, anchors for his fleet of warships on Lake Champlain. Today J&L is mining iron ore in the Adirondacks.

PREVENTING TOOL GALLING BY NITRIDING

Three treatments outlined cover wide range of steel grades and tool services

CYANIDING certain types of low carbon steels which in themselves lack the ability to harden when heat treated, alters the composition of the steel in the following manner: Carbon is deposited on the surface and thereby produces, with suitable heat treatment, a case hardened surface; and nitrides in the form of nitride needles of various alloys are formed to produce hardness otherwise unobtainable from carbon addition.

The element that produces these iron nitrides in the low carbon steels also combines and produces nitrides with a number of alloys, such as manganese, chromium, tungsten, molybdenum, etc. These nitrides, which are in a fine state of dispersion in the steel, show resistance to wear and abrasion, retention of hardness under adverse conditions, and resistance to certain types of corrosion.

Nitraloy was developed by Allied Steel & Chemical Co., New York, to employ this nitriding medium. Applied to a variety of keen edged tools that have previously been heat treated—such as taps, chasers, drills, etc.—a marked increase in both life and production ability resulted, and galling was reduced. Manufacturers are said to find that after one application of the salt, tool performance is increased by the attainment of longer life, increased production, and minimum breakage.

Recommended procedure for the use of this heat treating salt is as follows: (1) Forge and shape tools in usual manner; (2) after forging, tool surface is ground free of all scale, and cleaned of grease and oil to insure easy penetration of the salt; and (3) the salt is always allowed to dissolve on tool in the air, never in the container. Same precautions are observed in using Nitraloy as with other cyanide salts.

There are three general methods of treatment with this salt.

Treatment No. 1

This treatment is for all concussion type tools, chisels, punches, rivet sets, pneumatic tools, shear blades, moil points, concrete breakers, etc. Steel is heated to 1800-1900° F and the cutting edge is inserted in the powdered nitriding salt mixture. Powder should dissolve on tool in the air, not in the container. Cutting edge is reinserted as many times as possible until the heat of the steel will no longer melt the salts. All parts of the tool to be hardened must be reached by the flow of the melted salts.

Some salts are allowed to cling to the tool before reheating. Tool is reheated to 1450-1550° F, allowed to soak at this temperature for a few minutes, and then quenched in a light oil. (Sperm, linseed, cotton or any commercial quenching oil may be used.) The tool is not to be draw tempered.

Treatment No. 2

This is used for tools that have been hardened and tempered, ground or resharpened. This class includes such tools as cutters, reamers, taps, dies, gages and high alloy steels, etc.

A bath is formed by heating desired quantity of salt to 1050° F and is allowed to age at this temperature for ½ hour for each 10 lb of salt used. Preheating of the metal is recommended (800-900° F) although tools may be immersed cold. Regardless of the method employed, a film of salt forms immediately around the tool. This is due to the difference between the temperature of the bath and the tool. The film melts when the tool temperature approaches that of the bath; nitriding time must be considered to begin when this takes place.

NITRIDING TREATMENT No. 2
SIZE vs CYCLE

Small Tools:	
¼-in.	15-20 min
½-in.	20-30 min
¾-in.	30-45 min
Large Tools:	
1 in. diameter	45-60 min
2 in. diameter	60-90 min
Large Tools (by weight):	
½-lb	15-20 min
1 lb	20-30 min
2 lb	30-40 min
3 lb	40-60 min
Over 3 lb	60-90 min
Flat Tools (highspeed tools, etc.):	
¼-in. thick	20-30 min
½-in. thick	30-45 min
1 in. thick	45-60 min
Over 1 in. thick	60-90 min

Duration of nitriding treatment is dependent upon the nature of the part and varies from 5 to 90 min. The customary cycle is 20-30 min. A 5 min cycle will modify the tool surface sufficiently to overcome the seizure or galling of tool surface by material being cut. For extremely high surface hardness with satisfactory supporting depth, the time of treatment is increased to 30 min. Longer periods, up to 90 min are used for maximum wear resistance. Size and time cycles are shown in the accompanying table.

Where tools are to be used on nonferrous metals, aluminum, copper, hard rubber, plastic, bakelite, etc., the length of time may be longer.

The tool is removed from bath and allowed to cool to room temperature or, it is quenched directly in a light oil. As this treatment is conducted beneath the critical point, the temper of the steel will not be affected.

Tests reveal that if cold rolled steel or low carbon steels are subjected to the second treatment and allowed to remain in the bath for 1 to 2 hr, depending on size, at 1050° F, and quenched directly in water—a thin nitrided case will result. This case is file-hard and offers excellent resistance to extreme wear.

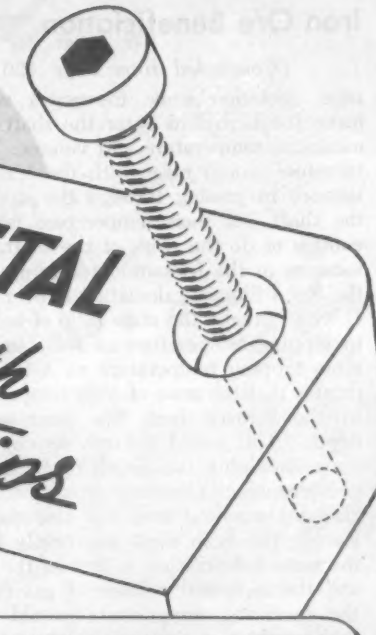
Treatment No. 3

Recommended for cold rolled steels, mild steels, low carbon steels, etc., Steel is heated to 1800-1900° F and inserted in Nitraloy. Again, powder is allowed to dissolve on part in the air and not in the container. Steel is reinserted in the salt mixture as many times as possible until heat of steel will no longer melt the salts. This operation is repeated 3-4 times to insure deep penetration of the nitriding elements. Steel is reheated to 1650-1750° F and allowed to soak at this heat for a few minutes. The steel may be quenched in water or 10 per cent brine solution.

Excellent tools such as chisels, punches, etc. may be made from common cold rolled steel if this method is employed.

In the older nitriding process using ammonia gas, 48 to 90 hr of treatment were required to produce cases 0.02 to 0.04-in. thick. In a modification of this process, called Chapmanizing, case depths of 0.03-in. were obtained in 3 to 4 hr. But in these as well as in the cyanide bath methods, steels of special analysis containing alloying elements having high affinity for nitrogen—were resorted to attempt to promote nitrogen diffusion.

Introducing KENNAMETAL TOOLS with "Screwed-on" Tips



TO HELP YOU CUT TOOLING COSTS ON MANY MACHINING OPERATIONS

STYLE 6ST
(3ST OPPOSITE HAND)

STYLE 12ST
(11ST OPPOSITE HAND)

STYLE 40ST
(39ST OPPOSITE HAND)

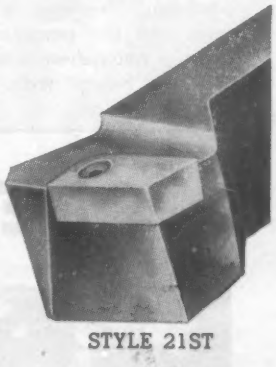
STYLE 2ST
(1ST OPPOSITE HAND)

Kennametal tools having tips attached with recessed-head screws —an arrangement developed and perfected by Kennametal Inc.—provide a practical, new way of obtaining even better performance from inherently efficient Kennametal.

The screwed-on assembly is a positive, simplified mechanical fastening of streamlined design. The screw, angularly positioned, serves merely to hold the tip firmly in the shank (heat-treated) against the recess walls, which of themselves resist the main cutting thrusts.

These new tools offer you many advantages, including: Easier, cheaper attachment, in your shop, of tip to tool; greater tip durability and more consistent performance; opportunity to interchange tips quickly in same shank; minimized stock keeping.

Kennametal "Screwed-on" tools are now available in larger sizes of fifteen different styles. Standard tips are made, of different Kennametal compositions, for cutting steel, cast iron, or non-ferrous metals. Catalog particulars and prices are yours for the asking.

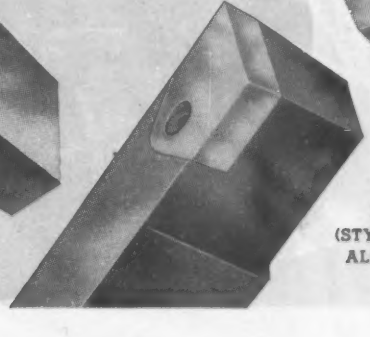


STYLE 21ST

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
TRADE MARK REG. U. S. PAT. OFF.
KENNAMETAL Inc., LATROBE, PA.

STYLE 10ST
(9ST OPPOSITE HAND)

STYLE 15ST



STYLE SGS
(STYLES SJL and SWS ALSO AVAILABLE)

Iron Ore Beneficiation

(*Concluded from Page 126*)

nace operation since the gases would leave the bosh and enter the shaft at a minimum temperature and volume. They therefore would meet with the least resistance in passing through the stock in the shaft, yet their temperature is high enough to do the work of the shaft. The increase in the formation temperature of the No. 1 Slag of calculation D over A-B-C with virtually the same ratio of basicity to tapping temperature as B-C, and the same tapping temperature as A-B-C, indicates that the zone of high temperature in the furnace bosh has increased in depth. This would not only require heat for maintaining the depth of high temperature which otherwise would be available for smelting iron but also the gas leaving the bosh must necessarily be of the same temperature as that of the bosh and the increased volume of gas due to the increased temperature would meet with greater resistance in its passage through the shaft. It seems reasonable to believe that such conditions would contribute to the causes of excessive blast pressure.

It seems reasonable that a concentration of highest temperature, as indicated in calculations B and C would provide the preferred thermal condition for carrying the maximum burden for any given silicon specification. Silicon and manganese require higher temperatures for their reduction than iron; consequently, the high temperature is needed for their reduction. Actual furnace practice proves that the control of the manganese reduction is a combination of both temperature and percentage of manganese in the mix, the percentage of the reducible manganese compounds varying with the temperature, and the percentage of the unreducible manganese compounds entering the slag. Silicon reduction is dependent upon temperature and the slag composition and all silica not reduced will enter the slag. Because of these proven reactions a concentration of highest temperature in a shallow zone at the bottom of the bosh should provide the needed temperature for the silicon reduction with a minimum of ill effect from expanded gases passing upward through the stock.

The thermal units concentrated in a high-temperature, lower-bosh slag are consumed in the useful work of silicon and manganese reduction and in coke ash assimilation rather than being drained from the bosh in excessively heated gases passing upward from the bosh, or in high-melting temperature slag tapped from the furnace. The foregoing reasoning appears to be amply supported by the description of the six actual furnace operations presented earlier in this article.

Table III presents condensed data from a calculation similar to that of Table I except that the silica (SiO_2) and alumina (Al_2O_3) of each slag total 47 per cent, with a ratio to each other the same as in Table I, and the calcium (CaO) and magnesium (MgO) oxides total 50 per cent, leaving 3 per cent for the minor constituents. In common practice such a slag would be classified as 3 per cent basic, or 0.94 acid/base ratio. As in Table I the total bases and the ratio of the bases to each other have been held constant. No. 2 Slags of calculations C and D are of compositions beyond the range of the McCaffery diagrams and the tetrahedrons could not be determined.

The effect of the increased basicity is clearly shown in the tetrahedron classifications and in the percentage and stage of calcium orthosilicate formation. Chart 2 shows the thermal effects graphically. The effect of the calcium orthosilicate percentages upon the thermal conditions in the furnace are clearly shown by the increase in the calculated temperatures of the respective slags. The temperature differences between the slags of Tables I and III are presented in Table IV.

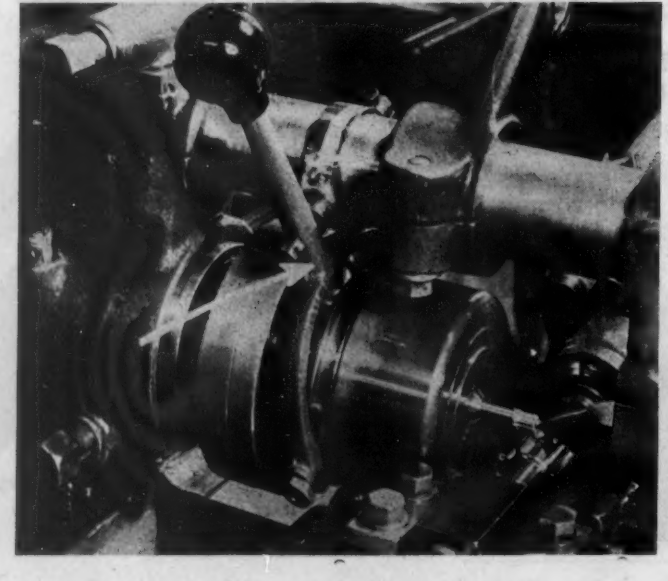
In the interests of conservation and concentration of heat in the lower bosh the important observation of Table IV is the increase in the temperatures of the initial and tapping slags. Gases from the 3 per cent basic slags leave the bosh at a higher temperature than those from the 3 per cent acid slags and therefore drain more heat from the bosh than the acid slags. Likewise the basic slags are progressively higher in temperature than the acid slags. Since the temperature of the iron tapped from the furnace is related to the temperature of the slag the basic slag and iron will drain more heat from the hearth of the furnace than the acid slag and iron.

The one exception of this condition is shown in calculation A of the 3 per cent basic slags of Table IV where the temperature of the No. 4 Slag is 1.37 per cent lower than No. 4 slag of the 3 per cent acid slag of Table II. The cause of the difference is easily traced to the silicate compositions of the two slags shown in Table V. Furthermore, the importance of the relation to each other of the slag compositions at the different stages of composition is emphasized.

Calculation A, Table III basic slags, finishes in tetrahedron No. 6 the same as calculations A-B-C-D of Table I acid slags but obviously the compositions preceding the tapping slag are not as advantageous to concentration of heat in the lower bosh as the compositions preceding the tapping slags of the 3 per cent acid slag compositions of Table I. The 3 per cent acid calculations, A-B-C, all begin and end in tetrahedron No. 6 while calculation D begins in No. 8 and ends in No. 6. The 3 per cent basic calculations, A-B, Table III, begin in tetrahedron No. 8 while C-D begin in No. 7. Calculation A finishes in tetrahedron No. 6 while B-C-D finish in No. 8.

(*Concluded next week*)

SPEED CHUCK MOUNTING



Extends Range of Machine

The scope of a machine can be widened with the installation of a new type speed chuck mounting. The illustration shows such a chuck, and a small spindle being hobbed on a gear cutter. This speed chuck, made by Zagar Tool Inc., 23880 Lakeland boulevard, Cleveland 17, is mounted at an angle so that operating handle clears the over-arm.

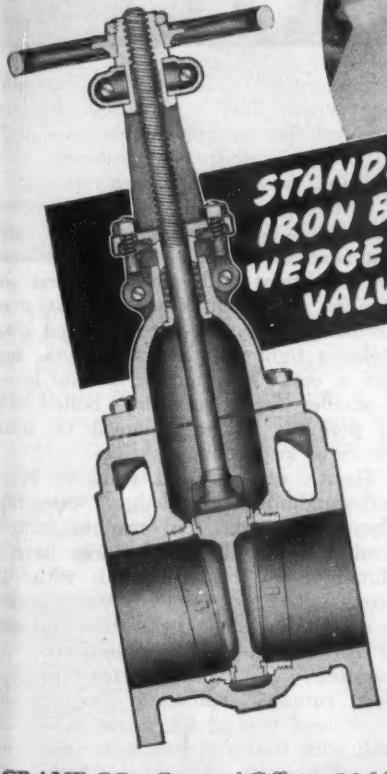
Instead of the conventional base mounting, the yoke of the chuck is mounted by pivoting through the handle near the bottom. Three advantages are gained by this type of mounting: (1) Small centerless work is held in a collet; (2) the entire fixture is mounted independently of the spindle and the fixture can be shifted slightly to make the collet run dead true; and (3) the collet does not move lengthwise, consequently the small part is not moved from the center, as with a draw-in collet, nor is it pushed toward the center to mar the surface of the work.

Piping Conversion *Simplified*... CRANE Supplies Everything

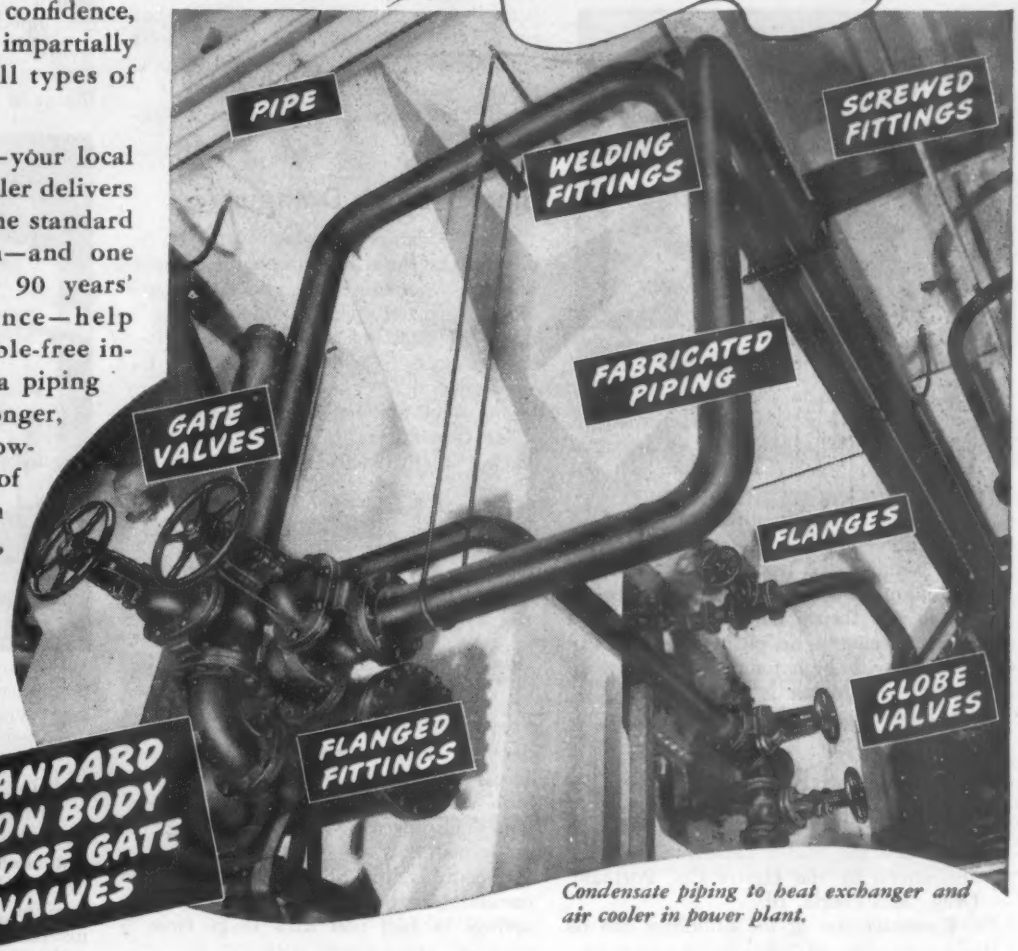
ONE SOURCE OF SUPPLY
ONE RESPONSIBILITY
ONE STANDARD OF QUALITY

• Whether your piping reconversion job is big or small, Crane is your logical partner to help get it done quickly. You select *all* materials from the world's largest line of valves, fittings, pipe, accessories and fabricated piping. You specify with complete confidence, for Crane can point out impartially the relative merits of all types of piping equipment.

Ordering is simplified—your local Crane Branch or Wholesaler delivers everything to the job. One standard of quality in every item—and one responsibility backed by 90 years' manufacturing experience—help assure time-saving, trouble-free installations. The result is a piping system that will operate longer, at highest efficiency and lowest cost. For one example of *complete* Crane lines in brass, iron, and steel valves, see below.



STANDARD IRON BODY WEDGE GATE VALVES



Condensate piping to heat exchanger and air cooler in power plant.

SERVICE RECOMMENDATIONS: **Crane Standard Iron Body Wedge Gate Valves** are suited for many services in factories and power plants, at all working pressures up to 125 pounds steam. Brass trimmed valves are recommended for steam, water or oil lines; all-iron valves for oil, gas or fluids that corrode brass but not iron. Made in O.S. & Y. and Non-Rising Stem patterns. See page 101 of your Crane Catalog.

WORKING PRESSURES

Size of Valve	Screwed or Flanged End Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-in., Crane 150-Pound Cast Steel Gate Valves are recommended. (For sizes under 2-in., use Crane Clamp Gate Valves.)

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. • *Branches and Wholesalers Serving All Industrial Areas*

CRANE

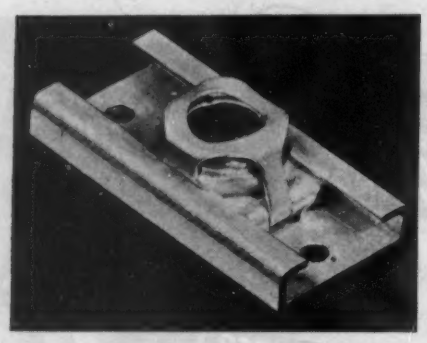
VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

INDUSTRIAL EQUIPMENT

Floating Anchor Nut

A floating anchor nut has been developed by the makers of Click gang channels, and is the only anchor nut employing replaceable standard nuts. It is offered in sizes from No. 6-32 to ⅝-in -24, the widest range of sizes made by any manufacturer.

Unit consists of base, retainer, standard nut and a patented steel spring clip, all



assembled. Clip holds the nut securely in place but can be easily disengaged by prying up with an ordinary screwdriver, permitting quick replacement of damaged nuts without special tools and without need for drilling out rivets.

Nut floats in all directions, insuring self-alignment of nuts with bolt axis. Base is fabricated from high strength ST aluminum and has high resistance to torque and thrust; flanges will not bend and nuts cannot be pushed out. It can be used with high temperature nuts, up to 650° F. Maker is Kaynar Mfg. Co., 820 East 16 street, Los Angeles 21.

Crane and Bulldozer

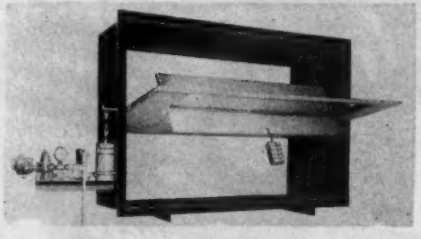
A combination dragline, clamshell and crane unit for tractor mounting has been announced by the Hyster Co., Portland, Oreg., and Peoria, Ill.

Extensive use of the bulldozer can be made without removing the Hystaway unit from the rear of the tractor, and when full bulldozer production is desired or other conventional capabilities of the tractor are called for, the unit can be removed in less than 1 hr. Hystaway unit can be installed in 2 hr. Full tractor mobility is retained, as crawler track oscillation is not impeded by the unit; when tractor rigidity is desired, this can be imparted by a crank control at the mast head. Easily transported by dump truck or flat-bed trucks, the Hystaway can be taken from one job to another for tractor installation. It has been field tested and is in production use on many road and construction jobs.

Smoke Stack Damper

Double damper smoke control is being manufactured by Campbell Engineering Co., Appleton, Wis., under the name of Stackmaster. The double damper is made in sizes to accommodate various smoke stacks to which it is applied, being designed after an engineering survey of the stack and boiler performance.

Its function is to adjust the smoke stack to daily weather conditions in or-

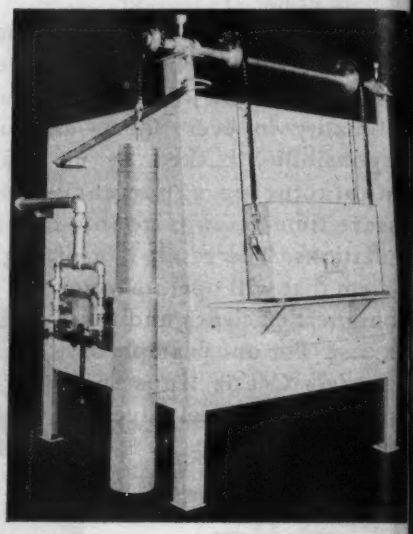


der to eliminate excess smoke, reduce excess stack temperatures, maintain uniform volume of draft and stop combustion fuel losses. Made of the highest grade materials and with efficient motors and controls, the Stackmaster is said to revolutionize boiler performance so that savings in fuel cost may range from 5 to 50 per cent as the efficiency of the boiler is increased.

The damper is installed with either electric, hydraulic, or pneumatic control system so that it may meet practically all conditions where there are excess smoke and combustion losses.

Batch Heating Furnaces

A complete line of standard oven or hearth type batch furnaces has been developed by W. S. Rockwell Co., 50 Church street, New York 7. They may be gas or oil-fired or electrically heated. Range of heating for gas or electric types



is between 600° and 1800° F; oil-burning types, 1200° to 1800° F; are intended for such operations as annealing, bluing, carburizing, hardening, normalizing, drawing and stress relieving.

Furnaces are made with reinforced steel shells, lined with refractory and insulation to meet the most severe heating conditions with minimum heat absorption and heat losses. A cast iron, insulating refractory-lined inclined door makes a tight heat and atmosphere seal and is easily operated by a hand lever. A smaller inspection door is bolted to it to permit charging, removal of small pieces or inspection.

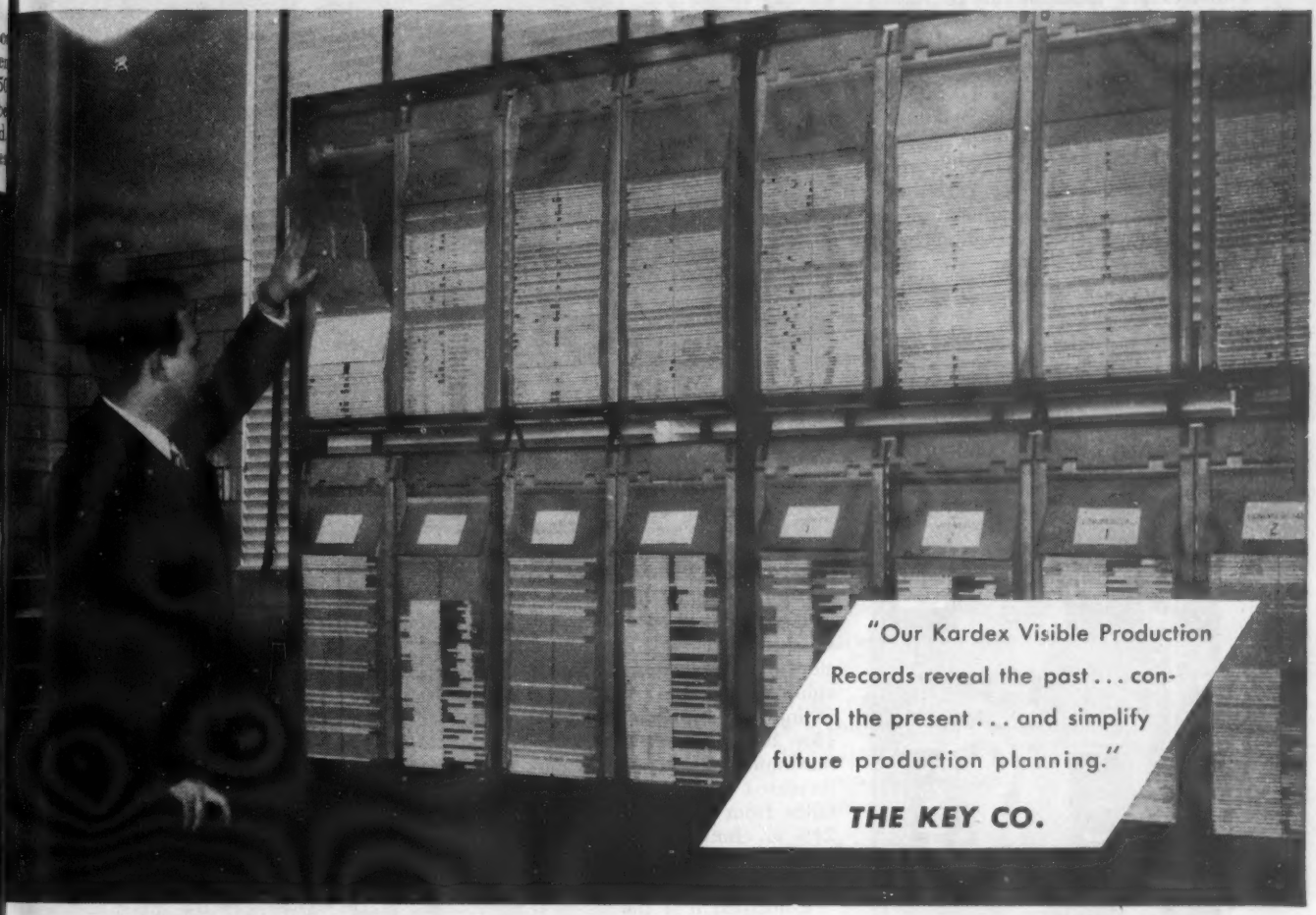
Hearth of fuel-fired furnaces is of carborundum with ledges extending above both sides and rear to form a semi-muffle. Electric furnaces have a chromium-nickel alloy hearth with upturned ledges. Ample distance between the hearth and the front and rear of furnace assures more uniform temperature over working area. In gas-fired furnaces, automatic proportioning equipment is used for single valve control, with Rockwell multiport alloy steel tunnel burners, firing from both sides of furnace. By use of double manifolds and Rockwell HY-LO gas burners, operating range may be extended to as low as 600°, and as high as 2200° F.

In oil-fired furnaces, (illustrated)

(All claims are those of the manufacturer of the equipment being described.)

KARDEX

"pictures" production SO JOBS STICK TO SCHEDULE


"Our Kardex Visible Production Records reveal the past . . . control the present . . . and simplify future production planning."
THE KEY CO.

In the important East St. Louis foundry of The Key Co., Kardex *Visible* starts by helping to plan production to meet delivery dates, and then goes right into the foundry and makes certain that actual output adheres to the schedule. Delivery dates bear no resemblance to numbers pulled out of a hat—they *match* plans and *meet* promises!

This Kardex record simplifies production planning and maintenance of delivery schedules for The Key Co.

Each week, the Kardex slides containing job and production data for that and the following week are removed from the cabinets and hung on the wall. A glance instantly "spots" any bogged down jobs and also discloses the details necessary to determine proper corrective action.

As the Graph-A-Matic Signals in the visible margin of each job "pocket" retract across the slide, they form a graphic chart, picturing in color the progress on each job order, as well as the relative progress of all jobs. Not only is control super-accurate with this system, but the time and expense involved in keeping incomplete and overlapping records are eliminated.

Let a Systems Technician help you bring "time-table" performance to your production and delivery scheduling. Just call our nearest Branch Office.

SYSTEMS DIVISION

Remington Rand

315 Fourth Avenue, New York 10, N. Y.

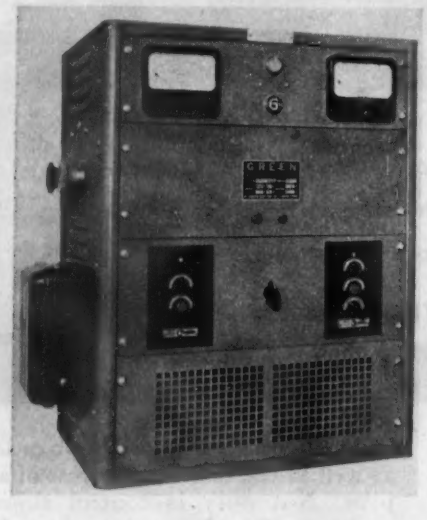
Rockwell oil burners, which may be manually or automatically controlled, permit a wide turndown range to assure minimum fuel consumption and temperature variation at desired operating temperature.

In electric furnaces, nichrome wire resistors are suspended from arch and mounted under hearth (as well as at the sides in larger furnaces). These individual type heating elements are easily removable without distrubing remaining elements.

Furnaces are available in 18 hearth sizes from 12 in. wide by 18 in. long to 48 in. wide by 96 in. long, to meet virtually every batch heating requirement, broad enough for load (steel) capacity from 50 to 1070 lb per hour at 1500° F. They may be equipped with doors at both ends, muffles, flame curtain, special rollers or rails for carburizing boxes or trays, cooling chambers, quench tanks and other special equipment to meet specific requirements.

Rectifier

A further advance in the rectifier field—rectifier affording high current output with low voltage—is announced by Green Electric Co., 130 Cedar street, New York. Unit is rated at 200 amp,



voltage range to 3 v. Voltage selected is maintained to within 50 millivolts over load variation to 200 amp, with line voltage variation of plus or minus 10 per cent. Voltage stabilization system includes electronic pilot device.

Jig Borer

Pratt & Whitney, division Niles-Bement-Pond Co., West Hartford, Conn., has announced a new feature added to its No. 3B jig borer, the largest size machine of this type made by the company. This is a large nondetachable precision rotary table built into the machine. Two table sizes are available, either 42 in. or 48 in. in diameter. This makes available equipment for precision boring to polar coordinates on large work in addition to regular rectangular co-ordinate work. Either one type or the other, or both, can be handled without change in setup. The new large rotary table replaces the regular plain rectangular table on the machine, and it is finished to the same close tolerances as all P & W jig borers.

Table is equipped with precision worm indexing mechanism which provides excellent accuracy for average work. For still closer accuracy, a spacing system may be provided in the outer rim. Power is provided for indexing the table, in addition to the regular horizontal and transverse power traverse on the machine

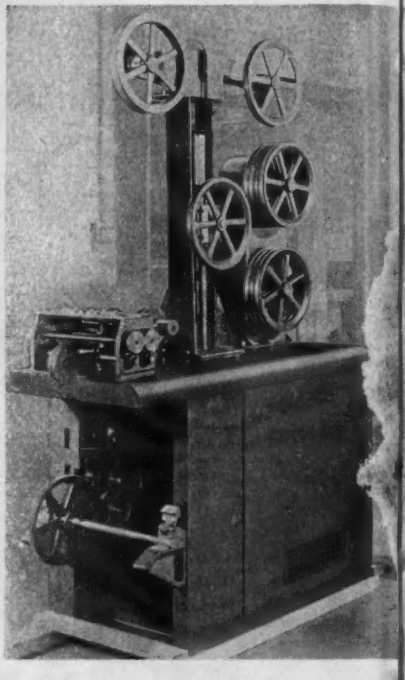
slides. Suitable binders lock table in position solidly while work is being bored. Work capacity of the two built-in tables is large. Either will handle holes bored on a diameter of 53½. The largest outside work diameter that will clear the column ways is 71 in. if the work will fit into the gap below the column ways (less than 14⅛ in. above the table) the maximum outside work diameter can be increased to 89 in. The standard distance from table top to spindle nose is 24⅛ in. Both this and gap distance can be increased as desired by using raising blocks under the machine column.

Construction of the tables is extremely rigid and provides for handling large jigs, fixtures and tools. Machine also will function for certain precision milling jobs within the limitations for which the jig borer can be expected to be used for this type of work. For this reason, machine is valuable also as a means of precision manufacturing on small lot production where the layout features will save an otherwise large amount of locating.

Wind-Up Machine

A heavy-duty wind-up machine for the constant speed, constant-tension winding of large diameter wire, cable, cords, rope, hose and other continuous materials, has been developed by Industrial Oven Engineering Co., 11621 Detroit avenue, Cleveland. It is a larger and improved model of the constant-tension wind-up machine developed several years ago. It will handle flexible insulated wire and cable in diameters up to 1½ in., and other materials in comparable sizes.

This machine is a complete, self-contained unit designed to maintain constant speed and tension within a variable production range. Standard speed r are 25 to 150, 40 to 200 and 60 t fpm, and tension values are from 1000 lb. It is motor driven and req no outside source of power or synch nization. Built originally to draw wir and cable through an automatic saturat ing and lacquering system, the machin is supplied either as part of such a sy tem or as an individual unit. Standar unit with sheaves such as those illustrate is used for constant-tension constant speed single reel take-up of large diam eter cable after extrusion jacketing, brai saturation, and cable stranding or bunch



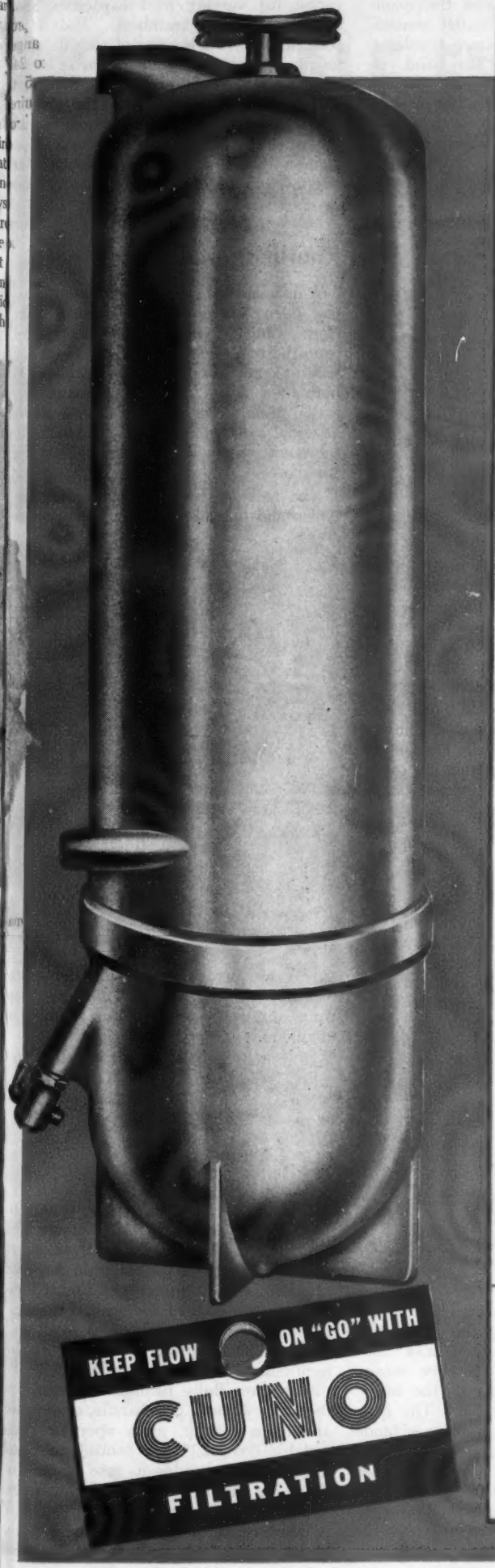
ing. Standard model of the large chine employs 42-in. reel, but a specia size to take a 60-in. reel can be supplied Special units can be equipped with jack-type casters for mobility. Input of horsepower varies with the speed and tension which are attained.

Magnetic Separator

A permanent magnet spout type PM separator is announced by Stearns Magnetic Mfg. Co., Milwaukee 4, which patents have been applied for.

Principal feature is the automatic discharge of tramp iron which eliminates any manual cleaning operation. When magnet is lowered, the accumulated tramp iron falls through a gate which operates in conjunction with magnet release. Thus when the magnet is returned to operating position, gate is closed and flow of material resumed. The magnet mechanism can be controlled from near or remote positions, an advantage which allows separator, when occasion demands, to be installed in places difficult of easy access and still permit automatic cleaning operation to be done readily.

Other features of permanent spou



Fine Finishes

...less filter cleaning with this lower-cost filter

Cuno's new COOLANT-KLEAN was developed especially for grinder coolants to help produce scratch-free surfaces . . . greatly extend wheel life and make element replacement quick and easy.

Here's new assurance of better finishes — and savings in filter cost, maintenance and replacement, plus a bonus in longer coolant life.

Firms using Cuno's new COOLANT-KLEAN have expressed amazement at the greater amount of dirt collected . . . the infrequency of bag replacement . . . and the elimination of "pick-ups" on the work.

You can now obtain — with COOLANT-KLEAN — extremely fine finishes, even at the end of an up-to-6-weeks period without changing the bag. Coolant stays cleaner — needs changing less often. Less loading of the wheel, too.

LOWEST-COST FILTER

COOLANT-KLEAN meets specifications at lowest cost. It is priced less, to begin with, than most filters. Maintenance is less — fewer new bags, less time for replacement (under 5 minutes), lower cost of new element — than for any other comparable replacement-element filter.

NEW CONSTRUCTION PRINCIPLE

COOLANT-KLEAN handles full flow of coolant or cutting oil, yet requires less floor space than other, more expensive types. No filter aid needed. Eliminates precoating time. Gets away from "stuffed type" elements. Is applicable to individual machine or central system.

DESCRIBES "FINER FINISHES AT LESS COST"

This newest advance in coolant-cleaning is described in Bulletin 3110. Send coupon now for your copy. Find out how simple it now is to obtain finer finishes at less cost.

SEND COUPON FOR INFORMATION ON FILTERING COOLANT

CUNO ENGINEERING CORPORATION
373 South Vine Street, Meriden, Connecticut

Gentlemen: Rush information on your new COOLANT-KLEAN filter for grinder coolants.

Name.....

Company.....

Address.....

Please send representative ☐

magnet include positive opening and closing of trap gate mechanism for discharging tramp iron; double-gap magnetic field at attract even the smallest particles of metallic material; magnet is held in operating position by magnetic attraction, eliminating latch arrangement; no outside electrical energy required, as a special magnet alloy steel provides a powerful magnetic field; no insulating shims needed when mounting in hammer mills; simple design with minimum of complicated parts, making for easy installation.

Magnets are designed to fit a wide range of spout widths from 8 to 24 in. in standard sizes.

Roller Conveyor

Materials handling equipment specially devised for conveying pipe, tubes, rods and bars is featured by John Moore Specialty Co., 6130 North Hiawatha avenue, Chicago 30. A roller conveyor that can be used as a single unit or in a line,

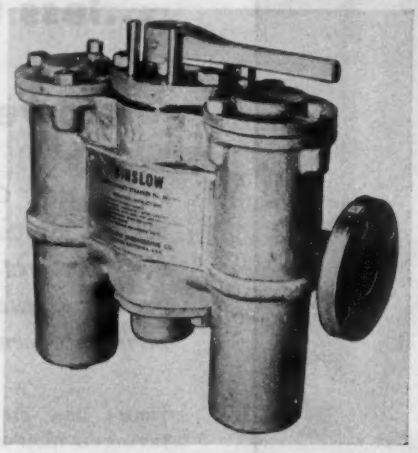
tandem fashion, for transferring material from box cars to warehouses, from bins to threading machines, etc., as a time-saver and accident safeguard is included.

Portable conveyor carries a lifetime guarantee, is safety approved, and may be ordered on a trial basis. It should be useful in steel warehouses, forging shops, machine shops, pipe mills, etc. The Herculean roller conveyor has an adjustable swivel center post which raises the roller to an overall height of 51 in. Minimum height is 38½ in. Floor space covered is a rectangle 28½ x 50 in.; weight capacity is 1000 lb. It handles up to 12 in. pipe and is built throughout of sturdy tubular stock. Individual weight of each unit is 81 lb.

Magnetic Strainer

Recently developed by Winslow Engineering Co. is a magnetic strainer which incorporates the effect of powerful permanent magnets with fine screening for the removal of metal particles from oil or other liquid systems.

Two cylindrical baskets consist of a main body of perforated steel, within which are fine wire mesh linings. The magnets are suspended within these baskets. The one-piece body, of either cast bronze or iron, incorporates the manifold, strainers, inlet and outlet connections, by-pass valves, pressure regulator, and main control valve. The hand operated three-way control valve permits change of flow from one strainer element to the other, or through both simultaneously. Flow is maintained through



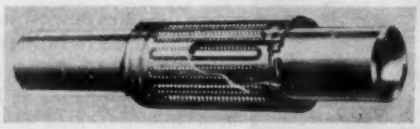
either one or both strainers regardless of the position of the valve control lever. With flow directed through one basket, the other basket and magnet assembly can be removed for cleaning as one unit. Outgoing pressure may be regulated by a valve adjacent to the three-way valve.

Some uses of the Model 200-MS-1 duplex strainer are: Filtration of cutting oils used with machine tools; filtering oil used in large speed reducing or speed increasing gears; diesel or steam power units to remove filings and metal cuttings during initial tests.

Ball Bushing

Thriftmaster Products Division of Thomson Industries Inc., 29-05 Review avenue, New York, has developed a ball bushing that permits unlimited travel of reciprocating mechanical members that may be either round or square, or variations of these shapes. Advantages gained from use of ball bearings for rotating parts thus now can be obtained on sliding members.

The ball bushing contains within it a series of ball circuits. One side of the



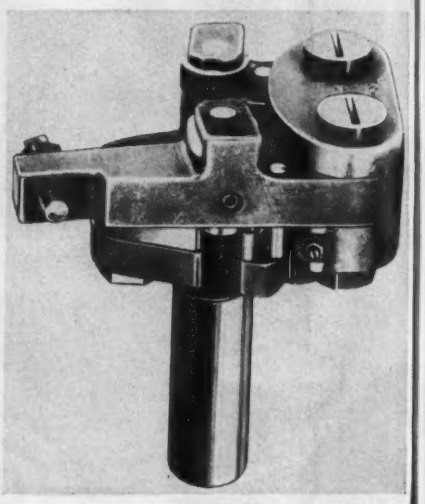
circuit carries the bearing load, with the other side returning the balls in a clearance provided in the outer race member of the bushing. Free movement is obtained because of the maximum elimination of friction. The continuous bearing prevents cocking or binding on the shaft because the bearing balls remain constantly centered under load. Rolling contact plus sealed-in lubrication prolongs the period of precision alignment.

System of ball circuits can be infinitely varied for varying load capacities and shapes of bearing members. Thus it is possible to have a bearing of considerable length or of a square, hexagon or octagonal section. This longitudinal ball bearing, under development for several years, is identified by the trade name Ball Bushing. Results to be expected from use are substantial reduction in size, weight and cost of machinery and equipment.

Knurling Tool

A new screw machine tool for knurling has been announced by Boyar-Schultz Corp., Chicago 12. Model K is operated from the screw machine turret. Feed and pressure are simultaneously applied to both sides of the work through cantilever action principle to exactly the same depth at equal pressure; this action avoids the transverse strains and "springing" on the spindle.

The tool can be used in knurling between and behind shoulders when neces-



sary. By operating from the centerline of material, regardless of diameter, the usual disadvantage of "knurl climb" is eliminated.

It is built in three sizes: OOK—0 in. min., ⅜-in. max, OK—3/16-in. min, 5/8-in. max; and 2K—1/4-in. min, 7/8-in. max.

Bantam Hammer

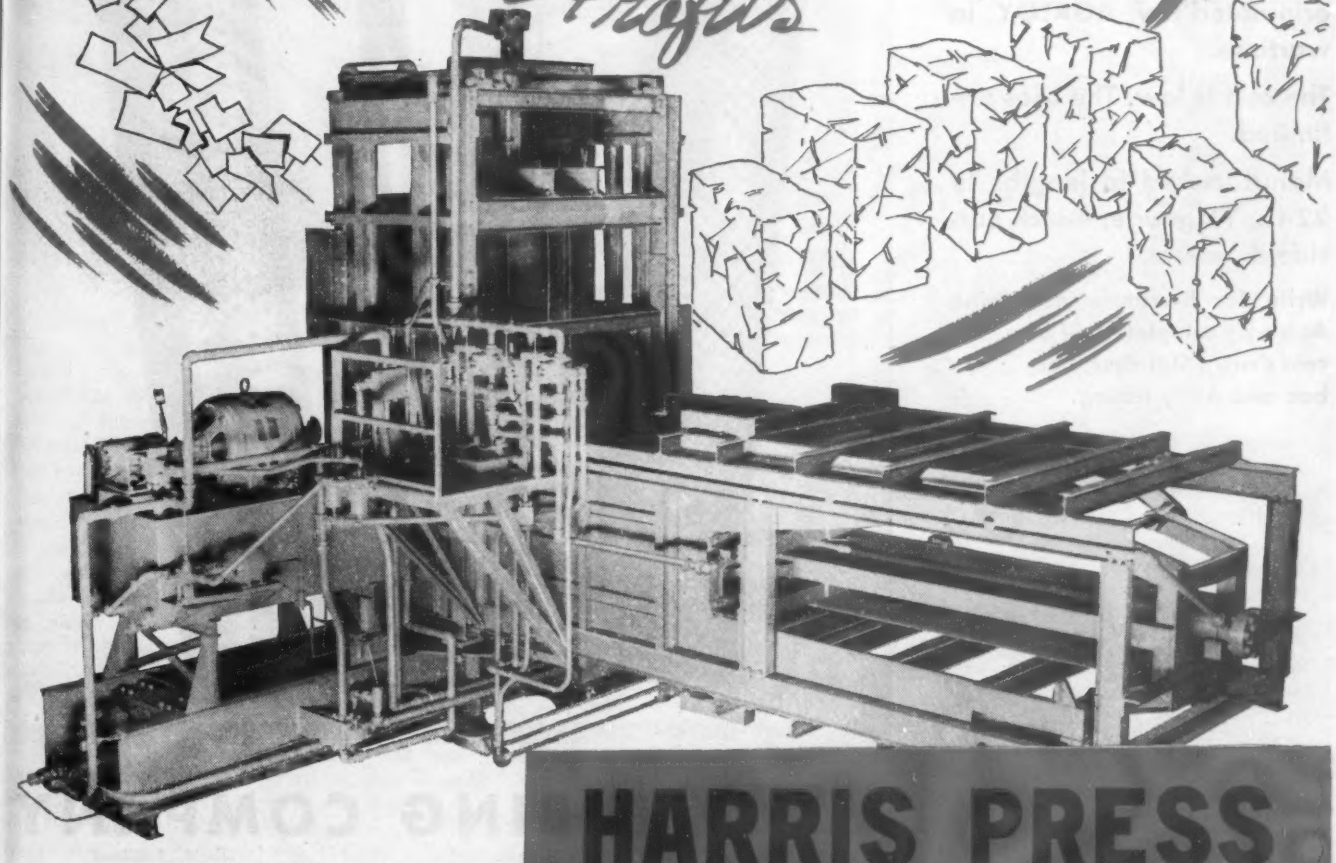
Small, powerful pneumatic hammer, delivering 13,000 blows per minute and operating on less than 2 cu ft of air at 80 to 100 psi, is available from Superior Mfg. Co., Public Square building, Cleveland. It is designed for special applications, where an exceptionally small tool with adequate power and durability are required. Weighing less than 2 lb, the Bantam Bully hammer fits easily in the hand. A pistol grip handle, of dimpled aluminum casting, gives operator comfortable control. Valve control, in pistol trigger position, adds to ease of control. Tools for hammer are loaded in a quick-acting ball-and-channel locking chuck. A quarter-turn of the knurled nose of the chuck locks or releases any tool. Hammer

BALE SHEET METAL SCRAP

for Greater Efficiency

Metal working plants with scrap metal balers worked to greatest advantage during the war. Floors cleared for action stepped up production and helped reduce accidents to a minimum. Harris 4-A presses operate without weight springs, and no air compresssion is required for returning Rams or Door. Hydraulic Power is employed throughout. Harris 4-A Press reduces scrap to orderly, easily handled bales ready for use by mills and smelters. Let us help you with your baling problems.

- Increased Profits



Harris Scrap Metal Baling Press Model 4-A

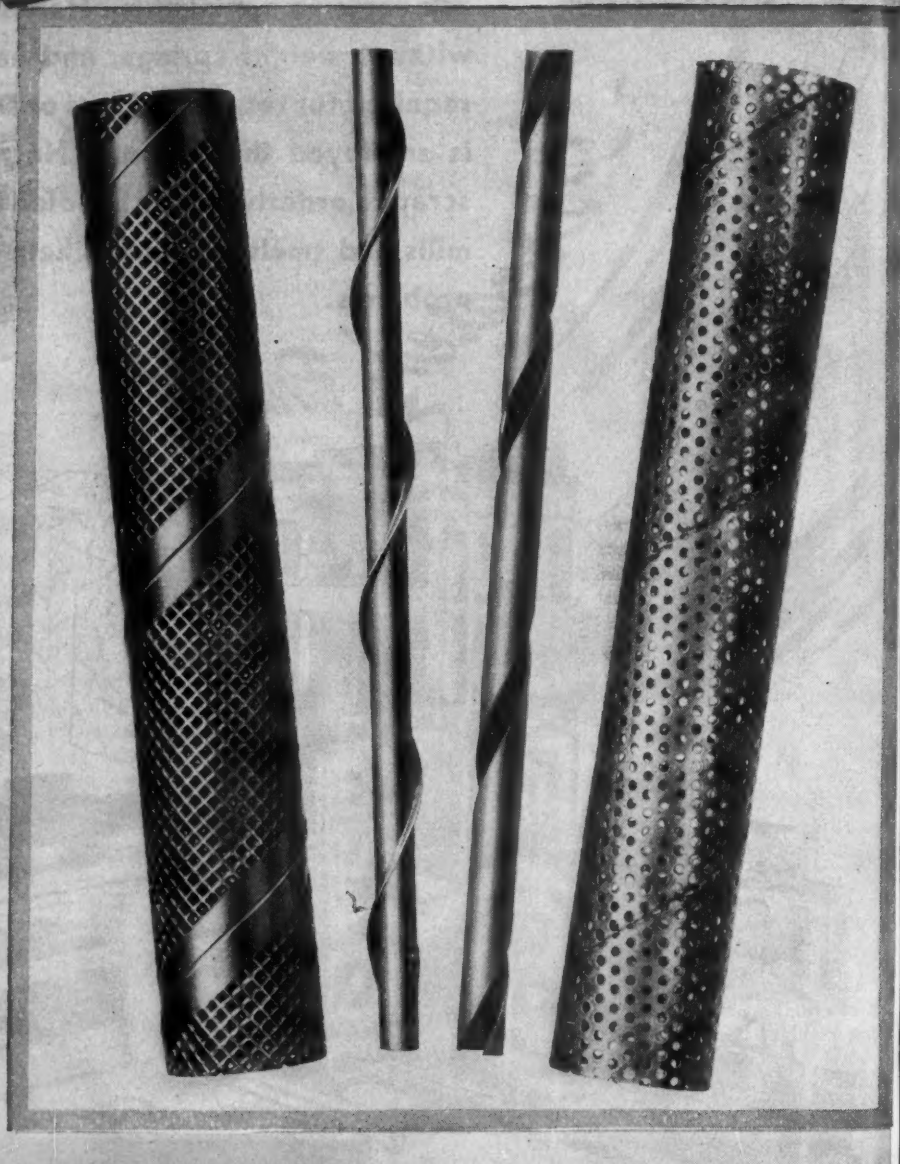
HARRIS PRESS

HARRIS FOUNDRY & MACHINE CO.

Reclamation Engineers Since 1889

CORDELE, GEORGIA

AGALOY DESIGN for PEACETIME



TUBULAR FORMS coiled from strip • Stainless steel • Monel metal • Carbon steel • Brass • Copper, etc. • A method originated by AGALOY in wartime.

The cost is low. The uses unlimited.

Manufactured in lengths to 22 ft.; 16 gauge; 4-inch outside diameter.

Write for literature describing Agaloy's complete line of cold drawn Stainless, Carbon and Alloy tubing.

AGALOY TUBING COMPANY

MILL: SPRINGFIELD, OHIO

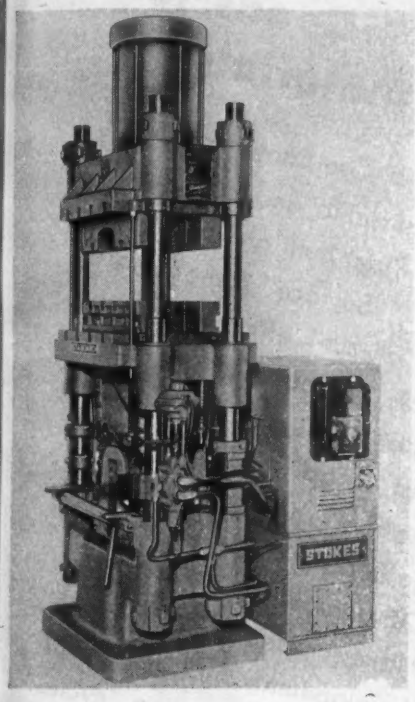
NEW YORK OFFICE: 75 WEST STREET, NEW YORK 6

CHICAGO OFFICE: 221 N. LA SALLE STREET, CHICAGO 1, ILLINOIS

has only one moving part, the piston striking member, which travels approximately ⅜-in. and normally operates between 12,000 and 14,000 blows per minute, depending upon trigger regulation and air pressure available.

Compression Press

F. J. Stokes Machine Co., announces a combination press for either compression or transfer molding. By using a single pumping unit, for applying pressure in compression molding and to lock mold shut and supply hydraulic pressure to transfer ram, a readily-converted, dual-purpose press can be made



available at a moderately increased cost.

Press is an adaptation of the Stokes-standard semiautomatic compression press. Transfer cylinder is mounted on head of press and operation of ram is controlled by a sequence valve. Power unit has greater capacity to provide the high mold closing speed and high ram speed to work most efficiently with induction or electronically-heated preforms in transfer molding. For compression molding, transfer cylinder is readily cut out simply by closing a valve and press is ready to be used in the conventional manner.

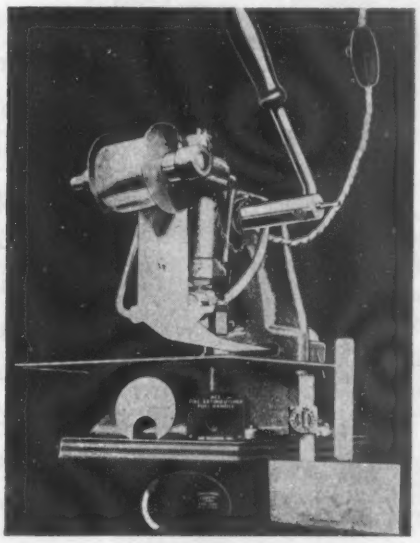
Several methods of loading are available. In one, a loading space is provided in the upper bolster. The mold having been closed, either the preform or powder is loaded into this space and pressure is automatically applied through transfer plunger after operator trips a safety control lever. Plunger moves rapidly in the clear and then builds up pressure at a lower speed as resistance develops. Entire action is very fast. In second loading method, loading is done directly on lower die plate, with press open. Preform is spotted in center of die and a push of start button completes cycle except for removing finished molding.

Advantages are stated as: Rapid, positive toggle action for closing and locking mold shut; elimination of usual pot with heavy sprue and waste; low hydraulic pressure, and consequent low maintenance cost; completely self-contained press with only one pumping unit; no floating platen necessary; simple design; fast acting; low initial cost. By simply closing a control valve the machine becomes a straight compression press.

Capacity is 150 tons; transfer cylinder pressure 30 tons; maximum opening between platens (lower platen up) 26 in.; platen area 26 x 23 in.; motor 5 hp.; height 11 in.; floor space 41 x 52 in.

Plastic Marking Machine

Acromark Co., Elizabeth, N. J., offers several machines specially developed for simplifying and expediting the marking of plastics. Shown is a No. 10 machine and dials, name plates, flat parts and plates, as well as metal dies used for hot stamping. An electric heat-



ing element, which operates through an ordinary light socket, heats the die or interchangeable type holder, which in turn applies the impression against the part. A strip of color transfer tape is fed automatically through the machine between die and part, advancing at each pressure stroke. Color transfer tape can be supplied in any standard pigment color as well as in metallic colors such as silver and gold.

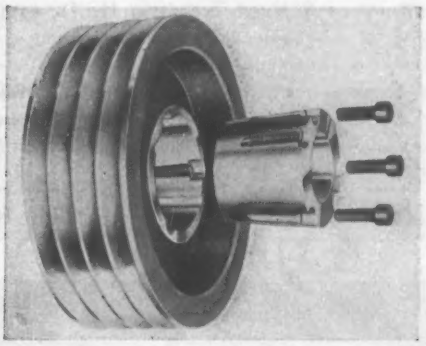
With this machine a wide variety of products can be marked. If they lend themselves to easy handling, marking speed of a single operator can reach as high as 30 to 50 pieces per minute. Average production time is around 25 pieces per minute. By use of a specially engraved steel side of extra depth, even hard molded parts can be efficiently and attractively marked in color.

A variation of this machine is in the No. 10AS machine (not shown). It combines a tool steel numbering head, a stamping bed and an adjustable cut-off, suitable for numbering and cutting off plastic tubing, so that plastic sleeves can be numbered and cut to a desired length in one operation. Heating element has a control and thermometer. Adjustable guide permits operator to cut pieces of tubing or sleeves to any length. Pieces may be marked serially or the same piece part numbered may be marked to facilitate assembly.

For marking molded plastics that require a considerable amount of pressure, Acromark No. 9AH machine (not shown), is used. The Hercules holder, a quick-change holder, an exclusive company product, can be used in the No. 9AH machine or any one of several other hot stamping machines. Interchangeable type is quickly changed by simple pressure on the holding clip; the steel type used is deeply engraved, and furnished with a proper flat face. Holder is extended along body of the type to give maximum heat efficiency.

V-Belt Sheave

Taperlock V-belt sheave manufactured by Dodge Mfg. Corp., Mishawaka, Ind., affords an effective means of quickly mounting and demounting V-belt sheaves. To install, it is only necessary to slip sheave and bushing assembly on to shaft and tighten two or three locking screws, depending upon size of



sheave. Screws are in threaded engagement with the sheave hub and free in the bushing groove. As screws are tightened, they push against tapered bushing, forcing it into the tapered bored hub. This causes bushing to contract and wedge between hub and shaft on which it is installed. To remove sheave from the shaft, locking screws are removed and one or two of them are inserted in jack screw holes, which are partially in the bushing and partially in the hub. Portion of the jack screw hole in bushing is threaded and that in hub portion is unthreaded. As screws are tightened, bushing is de-wedged and sheave is free for removal from shaft.

This construction provides a mounting of minimum dimensions for accommodation of the screws and their connection with hub and bushing. It permits use of a flangeless bushing and eliminates any extension of either hub or bushing or any collars or protruding parts. This re-

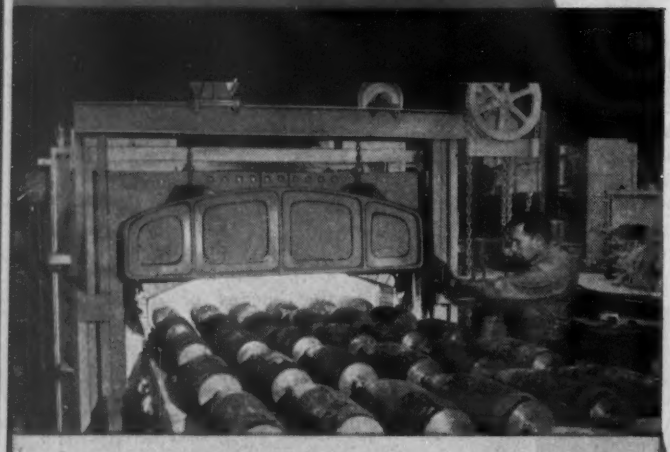
HEATING CAPACITY.. BIG TONNAGE

"Surface" Furnaces Deliver "HOT" Goods for Essential Materials

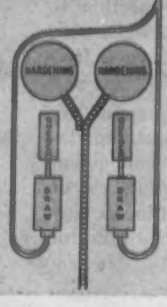
● In the great Kaiser Company, Inc. Steel Plant at Fontana, California and the adjoining Army Ordnance Plant built and operated by Kaiser Industries, "Surface" furnaces are operating in an "all-out" effort to supply essential materials to our fighting men. From the heating of billets and plates to the heat treating of large shells, "Surface" has provided modern equipment to produce unusually large heating capacity to meet BIG TONNAGE demands.

Each unit is equipped with "Surface" advanced developments including automatic controls for all heating cycles. "Surface" furnace design and construction is well known in the steel industry and with many years experience in economical fuel utilization, a low-cost-per-ton operation is assured.

Wherever heat is used—from ingot to the finished product, it pays to consult "Surface" Industrial Furnace Engineers about modern methods and equipment.



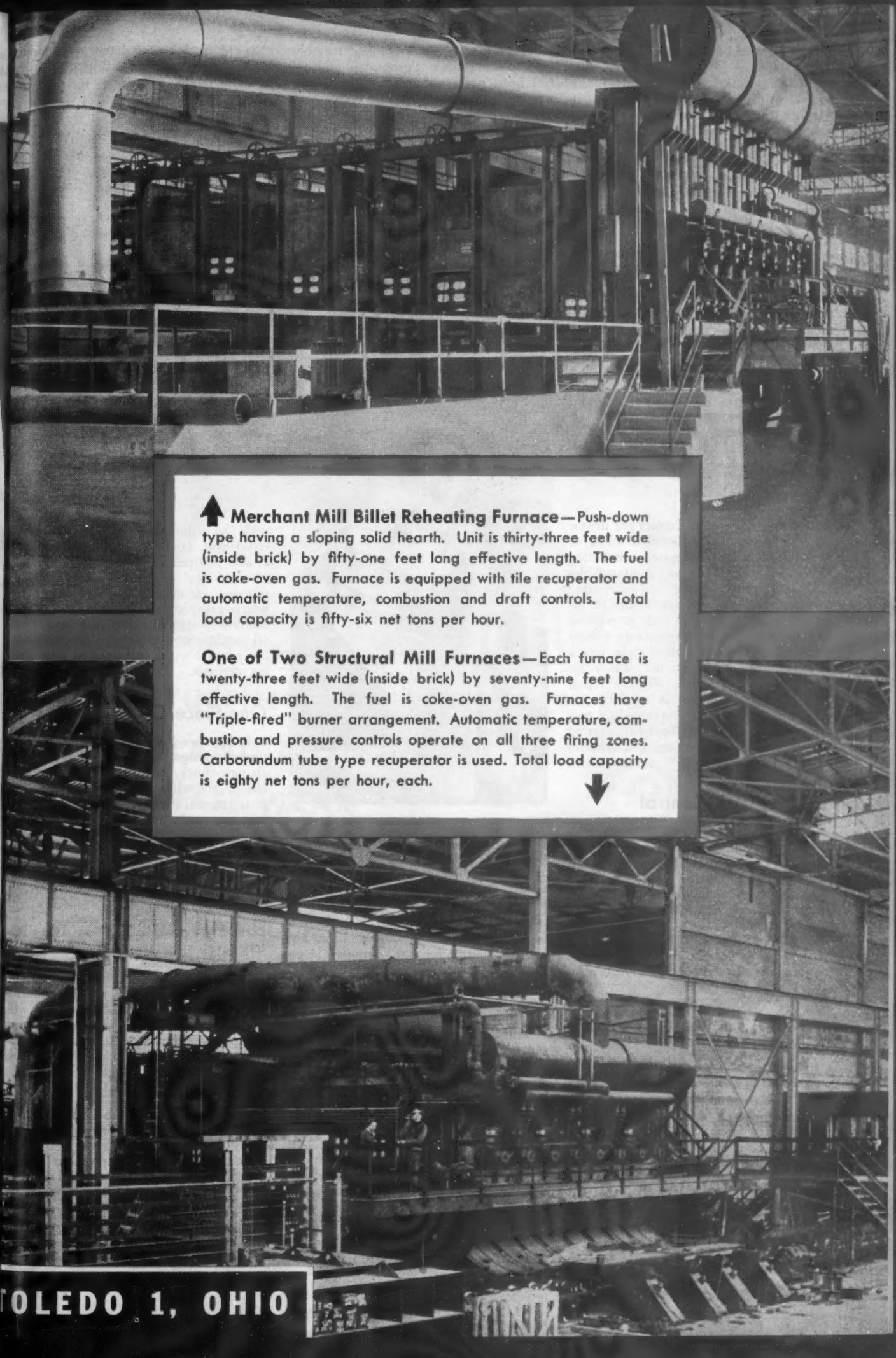
Battery of 8 Heat Treating Units, each line consisting of a Walking Beam Hardening Furnace, Automatic Quenching Mechanism, and Walking Beam Draw Furnace. Operation of the heating furnace, quench conveyor, spray equipment, and draw furnaces are synchronized by a timing clock which starts all drives simultaneously at adjusted intervals.



Two 8-inch Shell Heat Treating Units, each line consisting of a Rotary Hearth Hardening Furnace, Quench Tank, and Chain Type Recirculating Air Draw Furnace.

'Surface

SURFACE COMBUSTION



Merchant Mill Billet Reheating Furnace—Push-down type having a sloping solid hearth. Unit is thirty-three feet wide (inside brick) by fifty-one feet long effective length. The fuel is coke-oven gas. Furnace is equipped with tile recuperator and automatic temperature, combustion and draft controls. Total load capacity is fifty-six net tons per hour.

One of Two Structural Mill Furnaces—Each furnace is twenty-three feet wide (inside brick) by seventy-nine feet long effective length. The fuel is coke-oven gas. Furnaces have "Triple-fired" burner arrangement. Automatic temperature, combustion and pressure controls operate on all three firing zones. Carborundum tube type recuperator is used. Total load capacity is eighty net tons per hour, each.

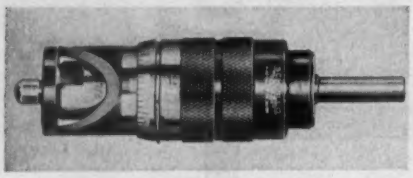
TOLEDO 1, OHIO

duces weight and facilitates mounting and demounting.

Wedging action provided gives the equivalent of a shrunk-on fit on the shaft whether it is standard or normally undersize. Bushing extends entire length of the hub, providing a full bearing surface. Close mountings are made possible because of elimination of flanges and collars. Construction also makes possible a wider range of bores and permits application to all stock sheaves.

Adjustable Countersinks

An addition to the Schrillo line of precision tools is the 6300 model micrometer adjustable stop countersink. A heavy duty unit capable of withstanding hard usage, this tool has a cutter capa-



city of ⅞-in. diameter. Cutters are driven off a ⅞-in. minus 20 threaded shank or a standard taper. Adequate lubrication is assured throughout useful life of the tool by a full length, self-lubricating bearing. Adjustments are made in increments of 0.001-in., and a positive lock prevents loss of this accurate adjustment. Taper shank cutter style has a self-contained knockout pin which facilitates cutter removal. Factory repair and rebuilding service is available on all adjustable stop countersinks, produced by Schrillo Aero Tool Engineering Co., 8715 Melrose avenue, Los Angeles 46.

Tension Lock Control

Arens Controls Inc., 2253 South Halsted street, Chicago, has recently developed a new push-pull tension lock control offering a positive lock for difficult control jobs. Manufacturer states the new control will hold any load pressure which can be applied by hand. It can be used in combination with rods and cables as well as other flexible or rigid push-pull remote controls and has already been in-

corporated as standard equipment in several industrial applications.

Consisting of a ½-in. steel sleeve, with all operating mechanism contained within it, control is compact and weighs only 8 oz. Aluminum T-shape control knob is designed for ease of operation and positively locks the control in any position of travel. Merely pulling out the control head sets control at any desired position, as wedge key inside control wedges itself against wall of the outer sleeve, preventing the inner sliding member from moving back. Pushbutton on control head depresses a spring which actuates wedge pin, thus giving it clearance of wall of outer sleeve and permitting the sliding control member to be moved in.

Welding Positioner

Welding positioner now available from Standard Machinery Co., Providence 7, R. I., has been designed to fill the need for a completely powered, entirely enclosed, multi-purpose machine which will provide easy and positive control of the rotation, elevation and tilting of work up to 700 lb, 6 in. from the table and 6 in. off center.

The machine is adaptable for moving work past the torch and quench in flame hardening operations. Table can be re-

moved easily and various jigs attached directly to elevating screw. Also, work may be mounted on table and set quickly at any angle to facilitate assembly and inspection operations.

Positioner is provided with built-in Standard variable speed transmission and hydraulic cylinder for definite power control with a single ½-hp 110, 220 or 550 v electric motor, so that linear speads from 1 in. to 180 ipm are readily set and regulated. There are no belts or clutches—reversing is instantaneous. To obtain a desired welding speed, it is necessary only for operator to note approximate radius at which welding is to be done, and to move control wheel until indicator is opposite the desired speed in scale column for that radius. Tilting of table through 135° from horizontal is controlled by a spring-centered handle which operator moves through an angle of about 45° in direction of desired table movement.

Table height is adjusted between 30 and 36 in. from floor by means of the elevating screw. Heights are readily changed by releasing latch and holding table against rotation while mechanism is set in motion.

Industrial Stools

Steel stools, available in five heights and 40 models, are being marketed by Lyon Metal Products Inc., Clark street, Aurora, Ill.

The 26 in. stool shown is equipped

with an adjustable back and pressed wood seat (over steel) and steel feet. It also features all-welded, nonbreakable construction; 14 in. wide seat with rounded corners; strong channel brace which provides a foot rest located at a uniform distance below the seat from all heights; steel glide type feet and long life pressed wood seat applied over steel for strength.

One-Piece Chuck

It has been announced that the improved design adopted for the quick-change chuck, permitting increased precision, embodies one-piece construction. It is internally ground to very close tolerances, and adaptors are externally

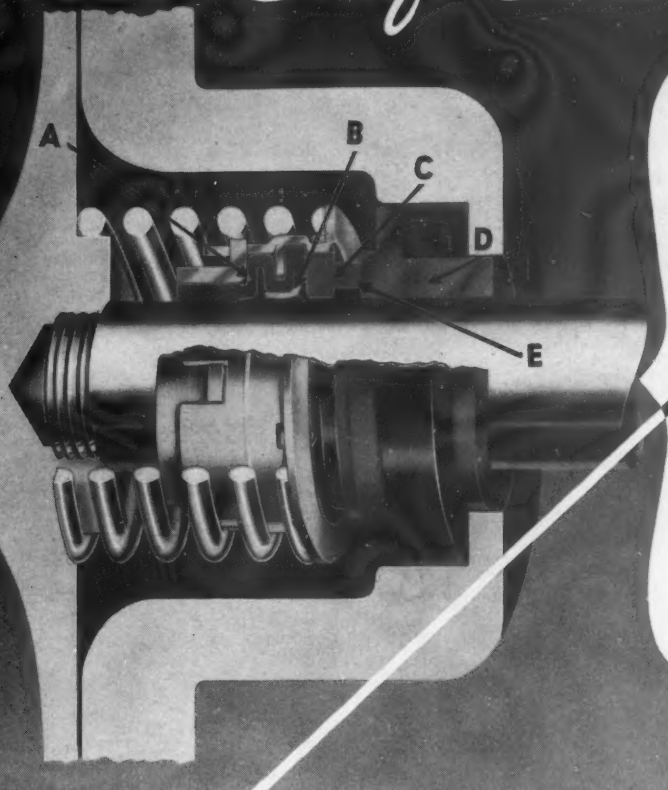
ground to a precision fit. New style adaptors have two set screws for an improved gripping action on the twist drill. Instant changing of drill is permitted by this chuck. Flute ends of broken drills can be salvaged and used equally as well as new drills. The chuck is manufactured by Zephyr Mfg. Co., Inglewood, Calif.

Thread Milling Cutters

New sizes of thread milling cutters are announced by Detroit Tap & Tool Company, 8432 Butler avenue, Detroit 11. Standard cutters now available include 12 new shell type cutters and 20 new shank type cutters which are available in either Jarno, Morse, or Brown & Sharpe tapers.

Additional sizes feature increased width of cutter face and diameter. Cut-

This NEW Shaft Seal Eliminates



A Synthetic Rubber Bellows—tail seals on shaft. Head is flexible; adjusts automatically for washer wear or shaft end play.

B Protecting Ferrule—prevents flexible bellows from adhering to shaft; assures free movement.

C Sealing Washer—rotates with shaft; driven through metal parts; no torque on bellows.

D Floating Seat—cushioned in synthetic rubber sealing ring, eliminating stress distortion of sealing faces.

E Sealing Faces—both carefully lapped at our factory to insure a perfect seal.

√ STUFFING BOX LEAKAGE
√ GLAND ADJUSTMENT
√ SHAFT WEAR

Pump Manufacturers and Design Engineers—**write for the new illustrated bulletin which describes the JOHN CRANE Bellows-Type Shaft Seal. This precision-built Shaft Seal is giving excellent service on centrifugal and rotary pumps, refrigeration compressors, agitator shafts—all types of rotary shaft sealing applications. Note these important advantages:**

- ***Flexible; adjusts automatically for wear***
- ***Eliminates stuffing box leakage and shaft scoring***
- ***Reduces friction to a minimum; saves power***
- ***Excellent for high speeds and pressures***
- ***Permits compact unit with less shaft overhang***
- ***Shipped complete; ready for easy installation***

CRANE PACKING COMPANY

1879 CUYLER AVE. • CHICAGO 13, ILL.

BALTIMORE, BOSTON, BUFFALO, CLEVELAND, DALLAS, DETROIT, HOUSTON, LOS ANGELES, NEW ORLEANS, NEW YORK, PHILADELPHIA, PITTSBURGH, SAN FRANCISCO, ST. LOUIS, TULSA

CRANE PACKING CO., LTD., Hamilton, Ontario, Canada.
Branches: Montreal, Toronto, Vancouver.

PORTRAIT OF PERFECTION

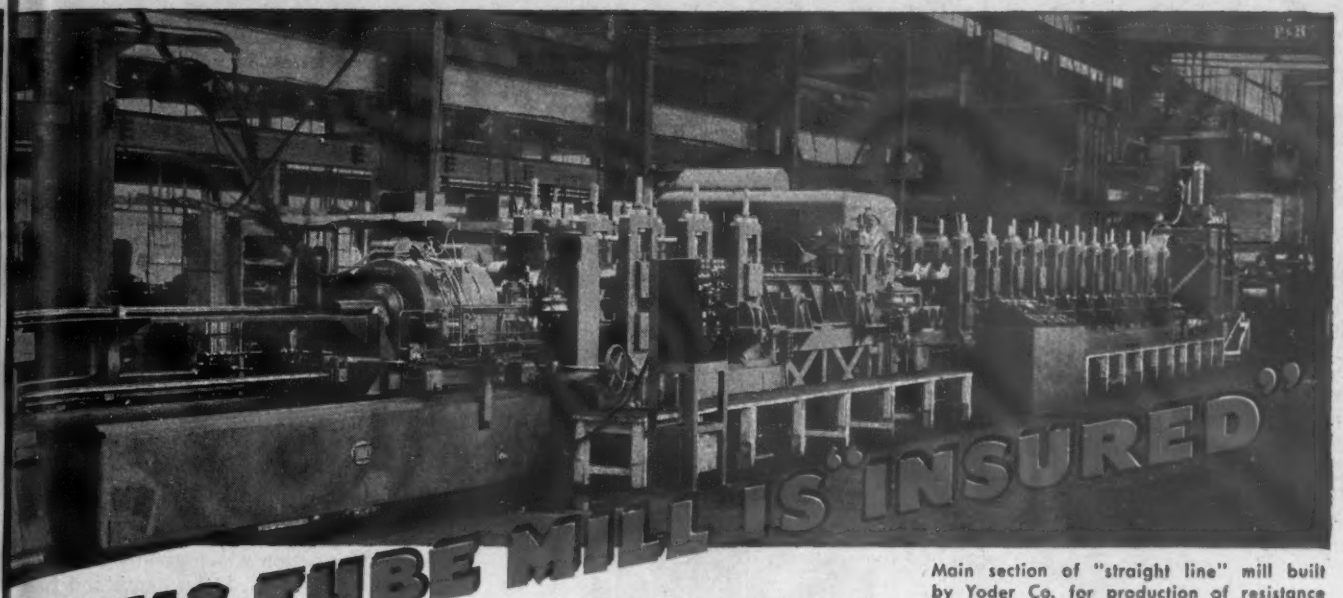
If it calls for precision handling, let McQUAY-NORRIS make it! Our knowledge of metals, our 35 years of experience in all phases of automotive precision-part making are the most versatile in the industry—and we love *tough* ones! Inquiries are welcome from any industry with peacetime plans.

TIME TESTED McQUAY NORRIS AUTO PARTS PROVEN IN SERVICE

FOR INGENUITY IN PRECISION ENGINEERING . . . IT'S

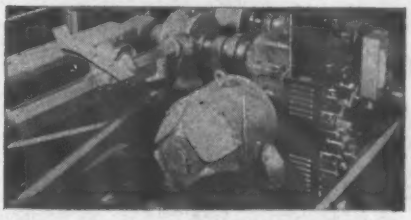
McQUAY-NORRIS
MANUFACTURING COMPANY
ST. LOUIS, MO. . . TORONTO, ONT.

PRECISION WORKERS IN IRON, STEEL, ALUMINUM, BRONZE, MAGNESIUM



AGAINST MOTOR FAILURE

Main section of "straight line" mill built by Yoder Co. for production of resistance welded steel tubing at a rate of 65 to 85 feet per minute, from coils of unpickled, hot rolled stock.



One of the two Crocker-Wheeler 3/5 hp motors driving the conveyor section of the Yoder tube mill.

A Crocker-Wheeler 150/200 hp motor drives the forming mill section.

This Yoder electric-weld tube mill is a line of separately driven machines, all perfectly synchronized and so interdependent that the failure of any one of the driving motors would stop the whole mill.

Continuity of operation is "insured" against failure by the anti-breakdown design and construction of the Crocker-Wheeler motors that power the successive tube-making steps. Here are four of the protective features that assure trouble-free, long-term service from the 47 Crocker-Wheeler motors used in the mill.

1. Patented bearing seals permit use of softer grease, for better lubrication and longer bearing life. Bearings require re-greasing only once a year or even less frequently.

2. Varnish treatment of windings reduces hot-spot temperatures and lengthens insulation life. Prevents vibration of motor windings.

3. Dynamic balancing of squirrel-cage rotors and d-c motor armatures assures practically vibrationless operation.

4. Where required, motor frames are designed to prevent dripping liquids and falling metal particles from entering the motor interior.

From coiled strip to finished tube, Crocker-Wheeler protected power is "always there" providing dependable service with minimum maintenance.

If you have an application where trouble-free motor operation is a "must", write for complete information on whatever type of motor you will need.

THIS YODER TUBE MILL IS EQUIPPED WITH THE FOLLOWING CROCKER-WHEELER POWER UNITS:

Direct Current Motors

4 — 15 hp — Cut-off
2 — 3/5 hp — Wash Machine
1 — 3/5 hp — Paint Machine
2 — 3/5 hp — Conveyor
2 — 3/5 hp — Cut-off Conveyor
1 — 150/200 hp — Forming Mill
1 — 20 hp — Pinch Roll
1 — 75/100 hp — Sizing Mill
1 — 30 hp — Leveller
1 — 40 hp — Trimmer
1 — 5 hp — Pinch Roll

Alternating Current Motors

1 — 7½ hp — Coil Box
1 — 7½ hp — Elevator
3 — ¾ hp — Pump Motor
1 — 15 hp — Cut-off
2 — 3 hp — Burring
2 — 3 hp — Runout
1 — 3 hp — Deburring
1 — 3 hp — Hydro test
1 — 3 hp — Loader
1 — 3 hp — Unloader
1 — 5 hp — Rotary Cut-off
3 — 5 hp — Stationary Cut-off
2 — 10 hp — Scrap chopper
2 — 5 hp — Electrode Rotator
2 — 1½ hp — Deburring
1 — 5 hp — Hydro test
1 — 2 hp — Hydro test
1 — 5 hp — Paint Machine
2 — 5 hp — Wash Machine
1 — 15 hp — Paint Machine

Motor-Generator Set

1 — 1000 KW — Motor Generator Set

CW-15

CROCKER-WHEELER ELECTRIC

A DIVISION OF JOSHUA HENDY IRON WORKS, AMPERE 33, NEW JERSEY

Branch Offices: BOSTON · BUFFALO · CHICAGO · CINCINNATI · CLEVELAND · DETROIT · LOS ANGELES · NEW YORK · PHILADELPHIA · PITTSBURGH · SAN FRANCISCO · WASHINGTON

SQUIRREL CAGE MOTORS WOUND ROTOR MOTORS DIRECT CURRENT MOTORS GENERATORS FLEXIBLE COUPLINGS

ters now available include as standard 12 types of 2 in. diameter shell type cutters with face width of from 3/4 to 2½ in. Each is available either topping or nontopping, with full length threads or with plain milling portions at either or both ends. Cutters are available with thread forms including Acme, Buttress, National, Modified Whitworth, for both internal and external thread milling.

Buffing Tool

The Keller 20 PA buffing tool, manufactured by Keller Tool Co., Grand Haven, Mich., is an angle type polishing unit operating at 2300 rpm for use with a 7-in. lamb's wool buffing pad.

This pneumatic tool has a plastic han-

dle to facilitate non-fatiguing operation, is 7 lb in weight, high powered, and of right angle design. Though originally designed for super-finishing the surface of jet planes, it is adaptable for use in automotive plants for finishing fenders and bodies on new automobiles.

Bits and Form Tools

Tru-Cut Tool Co., Detroit, announces a complete line of Blue Nose tools which includes tool bits, cut-off blades, form tools, and many others. They perform effectively on mild steel, alloys and tool steel, and are exceptionally adaptable to tool room work.

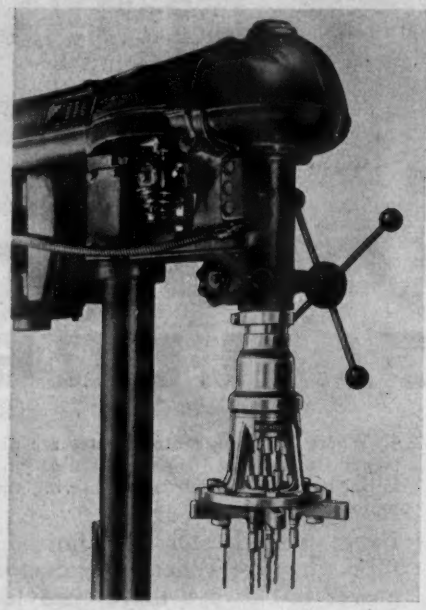
With a rockwell of 63 to 65, the tools

are not brittle and work well on some heat-treated materials and die blocks; they are not recommended for work on scaley forgings or castings. Precision-ground to fit most holders, Blue Nose tools are available in squares, flats and cut-off blades. Standard sizes of squares are from $\frac{1}{8}$ x $\frac{1}{8}$ x 2½ to 1¼ x 1¼ x 7 in; flats from ½ x ⅝ x 5 to 1¼ x 1½ x 8 in.; and cut-off blades range in sizes from $\frac{3}{32}$ x ½ x 4½ to ⅜ x 1 x 6 in. Each tool bit, ready for use without additional grinding, is available for immediate delivery.

Multi-Drill Attachment

Commander Mfg. Co., 4225 West Kinzie street, Chicago 24, announces the M-D, a six-spindle, universally adjustable multiple-spindle drilling attachment.

The attachment can be easily and quickly installed on most types of drill presses. It comprises a driving head



with six movable spindles, each of which is located by an individual radially adjustable arm. This design readily permits positioning of drills up to 17/64-in. diameter in any hole pattern, including a straight line, within a 5 in. diameter circle, with minimum distance between centers of 11/16-in. From one to six holes thus can be drilled simultaneously in one stroke of the drill press. Housing for drive gears, and supporting frame and adapters, are of special high-strength aluminum alloy. Entire attachment weighs only 13 lb. Modifications of this attachment also are obtainable for special applications.

Checking Machine

A base-pitch and tooth-spacing checking machine (model 1130), designed for the faster and more accurate checking of gears, is available from Michigan Tool Co., 7171 East McNichols road, Detroit 12. It will handle spur gears, helical gears, splines, worm wheels, etc. having an outside diameter of up to 12 in. and a maximum shaft length of up to 18 in.

Design and operation of this checking machine are based on the fact distance between two corresponding sides of adjacent teeth along the line of action equals distance between corresponding sides of adjacent teeth, measured on the gear's base pitch circle. Machine measures along the line of action, thus indicating whether spacing is correct both along line of action and along the base pitch circle of gear.

Plug Gages

A line of thread and cylindrical plug gages of Tantung, a nonferrous hard alloy, is available from the Master Gauge Co., Detroit.

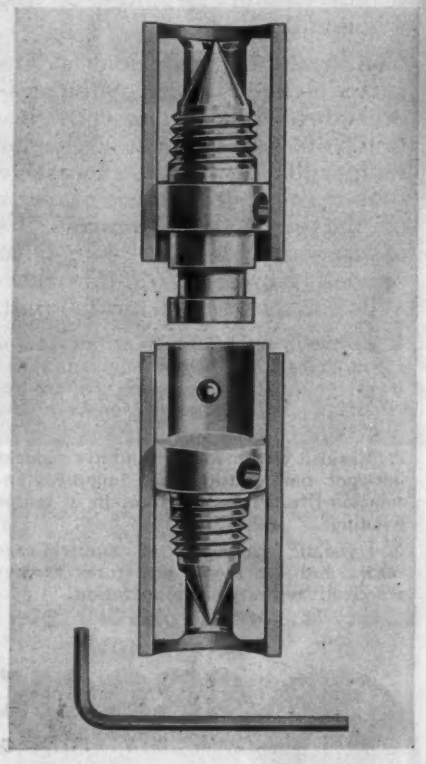
Tests indicate that these gages give unusually good performance. Alloy is hard, strong and tough, and contains cobalt, tungsten, chromium and tantalum-

columbium carbide. Latter imparts self-lubricating action which greatly increases resistance to wear. Metal dense and fine grained, and takes high finish. It is non-resisting, nonmagnetic and is not corroded by moisture or common acid or fumes.

Cable Connector

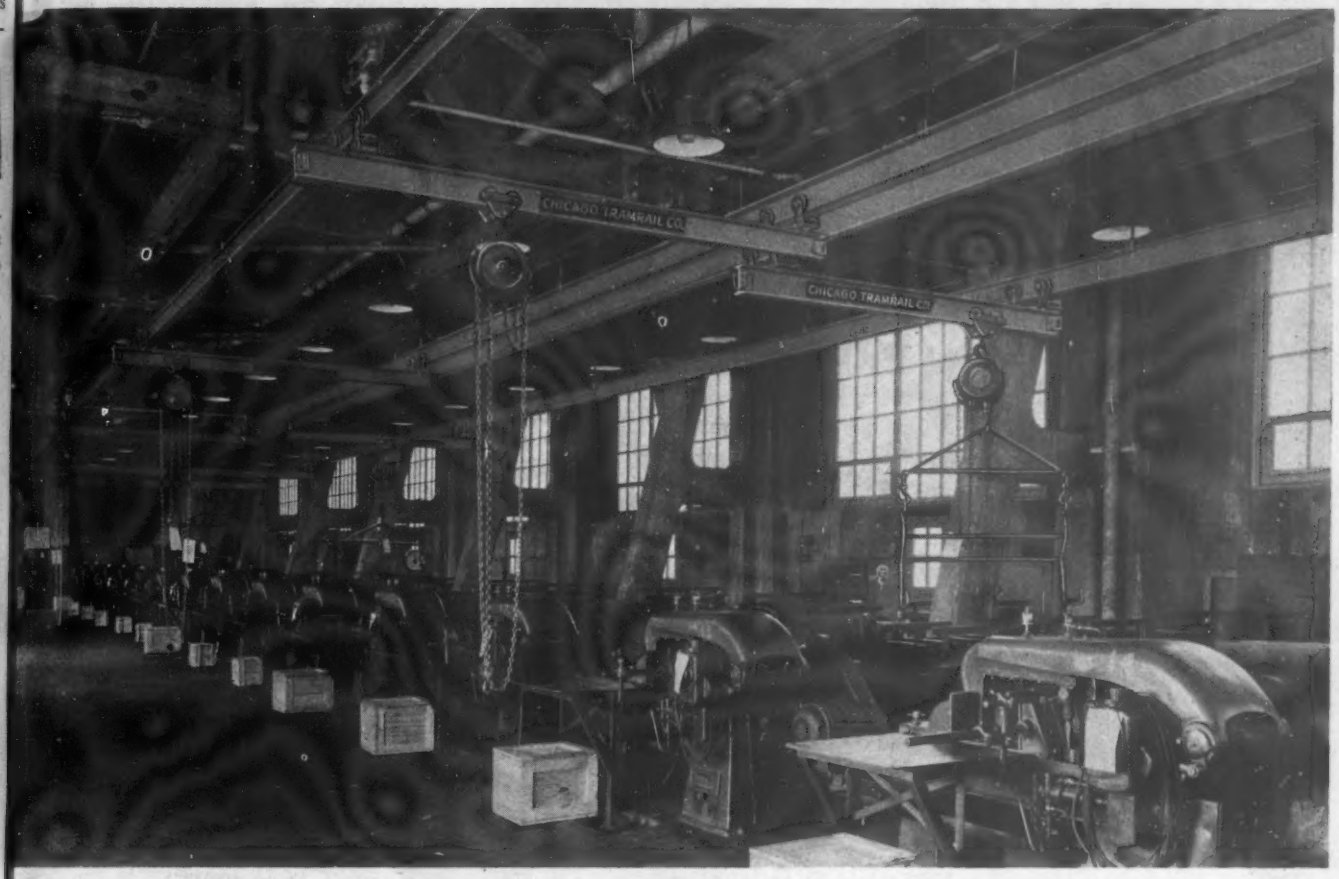
Fully mechanical and a secure cable connection can be made with the Garibay speed cable connector, quickly without need for molten lead or solder.

Connection is made by flaring end of cable and inserting it into the end of the connector and screwing tight. Opposing



end of the connector is inserted and given one-quarter turn and a secure, dependable connection is made. All parts are precision machined and remain in perfect alignment. The product is offered by Yarco Distributors, 215 West Seventh street, Los Angeles 14.

On the right track .... CUTTING STEEL



You are "On the right track" for some very substantial savings along with utmost operating efficiency, when you handle steel in this manner during the cutting operation.

Above view shows installation of Chicago Tramrail Overhead Cranes at one of Chicago's largest aircraft engine manufacturing plants. Here, working toward top efficiency, Chicago Tramrail Company engineers installed two overhead crane runways with 9 Chicago Tramrail Underhung Cranes spanning a battery of 18 automatic reciprocating hydraulic feed hack saws. Outside crane brings steel through wall hatchway where an inside crane picks it up, sets it up at automatic feed table for cutting, picks it up again and stacks it on the skid.

In view of the amazingly low steel cutting cost as compared to other previously used methods, the result of this installation has been no less than gratifying. Bear in mind—one overhead crane does the job of many because it operates throughout the room; the hoist shifts from one runway to another at various transfer points, or travels from one room to another. Let us prove that an installation of Overhead Cranes can save on labor by releasing your crews for other work. More—you clear the aisles and thereby reduce accidents. Above all—you *speed plant operations for increased profits!*

Write—ask us to submit specific recommendations. No obligation.

"On the right track"

CHICAGO TRAMRAIL COMPANY

2912 CARROLL AVENUE • PHONE KEDZIE 7475 • CHICAGO 12, ILLINOIS

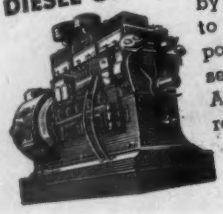
CHICAGO tramrail

TURN TO TYCOL "Engineered

ENGINEERED SOLUTIONS TO YOUR LUBRICATION PROBLEMS *at your fingertips*

Tycol lubricants are made in a comprehensive line to meet each specific service requirement. Their performance-proved lubricating ability is the result of modern scientific engineering and rigid testing. The line includes:

DIESEL OILS of 100% paraffine base, refined by the most modern processes to eliminate unstable compounds that would oxidize in service. There is a Tide Water Associated Oil for every Diesel requirement.



SPECIALIZED INDUSTRIAL LUBRICANTS for all types of machinery in all types of industry — from steel to textile.

GREEN CAST GREASES, made from paraffine base cylinder oil with a minimum of soap . . . extremely economical, giving greater lubrication per pound than do conventional greases.

TURBINE OILS with great stability and resistance to emulsification . . . free from sludge-forming hydrocarbons . . . engineered to inhibit Rust.

VEEDOL MOTOR OIL, refined from 100% Pennsylvania Crude by Tide Water Associated's triple-refining process, which produces that tough "film of protection" — famous all over the world.

CYLINDER OILS refined from 100% Pennsylvania Crude. They have exceptionally high resistance to breakdown under high temperature operation.

Any Tide Water Associate office will help you select the oil or grease best suited to your needs.

Drums! Drums! Drums!

War needs make it imperative that all empty drums be returned immediately.

TYCOL

TYCOL INDUSTRIAL

ENGINEERED FOR EVER

Lubrication"

FOR GREATER SERVICE...LONGER LIFE

from *everything* that *TURNS!*

All equipment will last longer — give better service — if the proper lubricant is used. That's why you will find it profitable to use Tycol oils and greases.

There's a reason! No matter what your lubricating need — extreme pressure*, high or low temperature, high speed, or any other service condition — there's a Tycol Oil or Grease scientifically engineered exactly to suit your specific requirements.

Refined from the highest grade crudes, Tycol lubricants are exceptionally resistant to breakdown which means greater economy . . . longer machine life for every type of equipment.

Tide Water Associated engineers will gladly recommend the Tycol lubricant that meets your particular requirements. Call, write or wire your nearest Tide Water Associated office today.

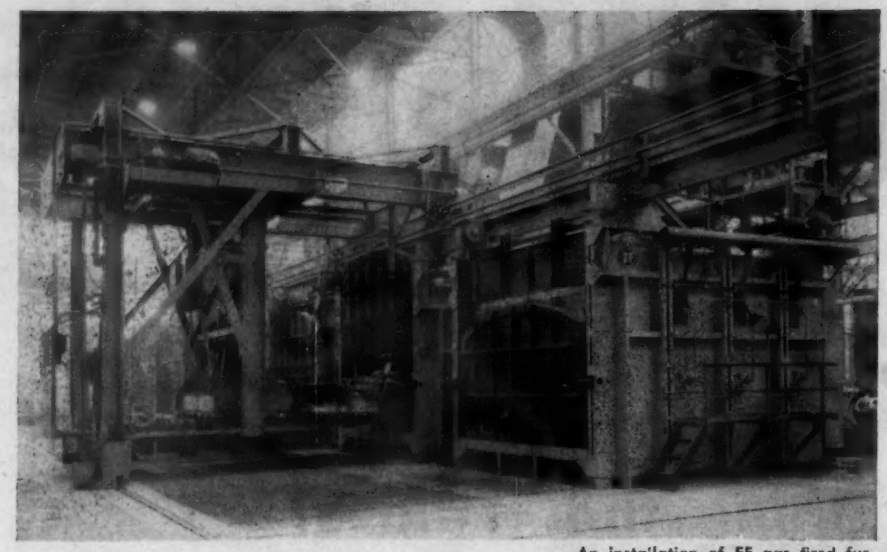
Makers of the Famous VEEDOL Motor Oil

***EXTREME PRESSURE!** For clear, concise descriptions of the basic tests used to determine important lubricant properties — Viscosity, Pour Point, Extreme Pressure and many others — consult Tide Water Associated's informative handbook "Lubricania". For your FREE copy write: Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

LUBRICANTS
RVICE NEED

TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE · NEW YORK 4, N. Y.

PRINCIPAL OFFICES
BOSTON · PHILADELPHIA
PITTSBURGH · CHARLOTTE, N. C.



An installation of EF gas fired furnaces with quench and gantry crane for various annealing and heat treating cycles on large parts and products.

For
Production Furnaces

For Handling Products in Any Size or Shape

FURNACES OIL, GAS or ELECTRIC
For Every Heating and Heat Treating Process

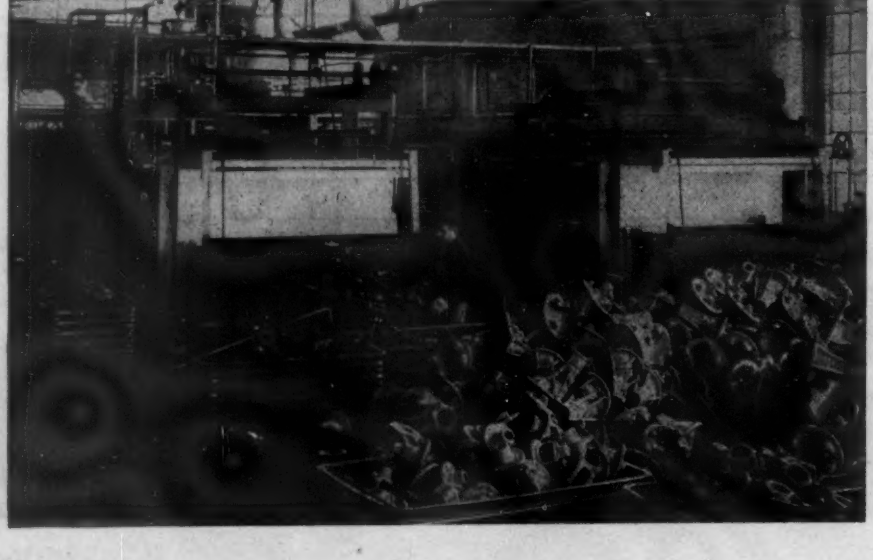
Aluminum Brazing
Annealing
Billet Heating
Bright Annealing
Bright Hardening
Copper Brazing
Controlled Atmosphere
Carburizing
Drawing
Enameling
Forging
Hardening
Malleabilizing
Silver Soldering
Nitriding
Normalizing
Soaking Pits
Scale-Free Hardening
Quenching Machines
Ceramic Kilns, etc.
Process Heating

We Build the Furnace to Fit Your Job
THE ELECTRIC FURNACE CO.
SALEM, OHIO

For Production Furnaces, For Any Process or Production, Consult

The Electric Furnace Co., Salem, Ohio
No Job is Too Large or Too Unusual

Scale-free, uniformly annealed castings are discharged continuously from the EF special atmosphere furnaces shown below.



Contour Forming

(*Continued from Page* 113)

country, as well as for several in oth countries.

Incoming contour forming work divided by the company into two classe (1) Work that can be done by what called compression forming; or (2) wo that can be done only by stretch formin It soon became apparent that a tool ha to be developed that would do eith work as needed, or else the tool woul have a very limited field. Several ma chines were made which were suited either one or the other purpose. In fac one machine had a compression head o one side and a stretch head on the othe it worked but—it wasn't much good.

It is only within the last few yea that a really satisfactory universal to has been developed. From the knowledg obtained in the development of this ma chine, specialized machines for quanti production can now be rather rapidl designed. Present basic machine is know as universal contour former, illustrated i Fig. 7.

Variety of Work Produced

Properly tooled, this machine wi produce a surprising variety of wor either by stretch forming as in making complete steel side rail and half th roof of a standard commercial bus, o in producing rather difficult sectio known as the "rub rail", a common ele ment in trailer manufacture. The ma chine will produce stretch formed ring in stainless steel, or stretch sheets suc as the changing cross section of a win tip, forming irregular contours in tw planes. By some elaboration of die set up, it will make curves as shown in Fig 5, which are wheelhouse angles, or th angles which support the housing of th bus wheel. These shapes have a co ordinate curve in several planes. O the same machine it is possible t produce reverse stretch bands and t handle either rolled or brake forme shapes, extrusions or sheets either stee or aluminum. Such shapes would other wise be of several pieces welded to gether.

Also, there is an advantage in th method from a power standpoint inas much as the forming takes places pro gressively. The total pressure to form a bus bumper with its reinforcing cor rugations would, if done at one time run over twelve hundred tons, yet b means of a progressive operation this i done with no more than 25 tons at any one time. The production is rapid and there is no loss of material in trim. The progress is well adapted to the develop ment of new types of bumpers wherein bumper protection is extended around to take in the fenders. Specialized ma chines are being developed to take care of this work on a production basis.

Process used in compression forming i to make a die either of steel plate cut t size as required, or some suitable iron alloy, or kirksite and occasionally masoni

Now—MATCH THEIR BEST WITH YOUR MOST IN THE VICTORY LOAN!

Top off your good work on your Payroll Savings Plan with an outstanding showing in the Victory Loan—our last all-out effort!

Help bring our boys back to the homes for which they fought—and give our wounded heroes the best of medical care—by backing the Victory Loan! You know your quota! You also know by past war-loan experience that your personal effort and plant solicitation are required to make your quota.

Sell the New F.D. Roosevelt Memorial $200 Bond through your PAYROLL SAVINGS PLAN!

In rallies, interdepartmental contests, and solicitations, promote the new Franklin Delano Roosevelt Memorial $200 Bond! Better than "cash in hand," Victory Bonds enable the buyers to build for the future—assure a needed nest egg for old age.

Keep on giving YOUR MOST to the Victory Loan! All Bond payroll deductions during November and December will be credited to your quota. Every Victory Bond is a "Thank You" to our battle-weary men overseas—also a definite aid in making their dreams of home come true! Get behind the Victory Loan to promote peacetime prosperity for our returning veterans, your nation, your employees—and your own industry!

The Treasury Department acknowledges with appreciation the publication of this message by

VICTORY LOAN

STEEL

This is an official U. S. Treasury advertisement prepared under auspices of Treasury Department and War Advertising Council

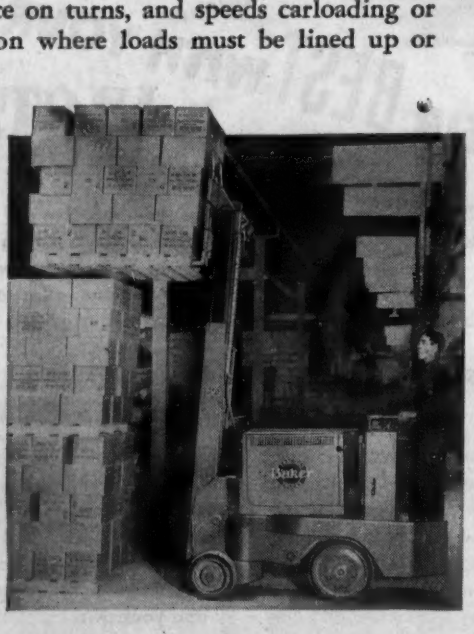
New Baker ARTICULATED Fork Truck cuts aisle requirements

DESIGNED PRIMARILY FOR EFFICIENT WAREHOUSE OPERATION

A basically new design* involving a new method of steering by "articulating" the frame, permits swinging the load to line it up in position without lining up the truck itself. Thus this truck requires about two feet less space for placing loads at right angles to aisles. It needs less clearance on turns, and speeds carloading or any other handling operation where loads must be lined up or positioned in congested areas.

Specific advantages of this truck are:

1. Works in narrower aisles.
2. Turns in a smaller radius.
3. Spots loads quicker and easier.
4. Control units are more accessible.
5. Simpler Steering design cuts maintenance.
6. Permits mechanization of handling where hand trucks were necessary because of space limitations.



Field tests in both warehouse and production operation have proved the many advantages of this new truck. For complete specifications request Bulletin 1330.

*Licensed under Stevenson Patent No. 2,284,237.

BAKER INDUSTRIAL TRUCK DIVISION *of The Baker-Raulang Company*
2167 West 25th Street • Cleveland, Ohio
In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

ite sometimes steel lined. The type of material for the die naturally depends on the quantity to be produced. The advantage of the softer materials is that they are more readily corrected for springback. By compression forming, it is usually meant wiping or rolling is used to force the given shape into or onto the contour block. This method is in general best suited to the more ductile materials, or to materials in which the depths of sections provide assurance that the material is carried sufficiently beyond its elastic limits to maintain a set. Roughly speaking, the more severe contours can only be made by this method, which really means that the inside diameter of the shape is compressed and the outside is stretched. One element 36 in. long, a hat section, during the progress of working stretched in its outside members 6⅞ in. and at the same time compressed the inner flange 5⅛ in. Though this represents a lot of moving in cold metal, the piece was wrinkle free and a good looking job.

Long, swinging curves are hard to hold in compression forming, as the material is apparently not taken sufficiently beyond its elastic limits to hold the shape after the pressure is removed, and there is a lot of springback. On the other hand, stretch formed material on the same block will lay very close to the shape.

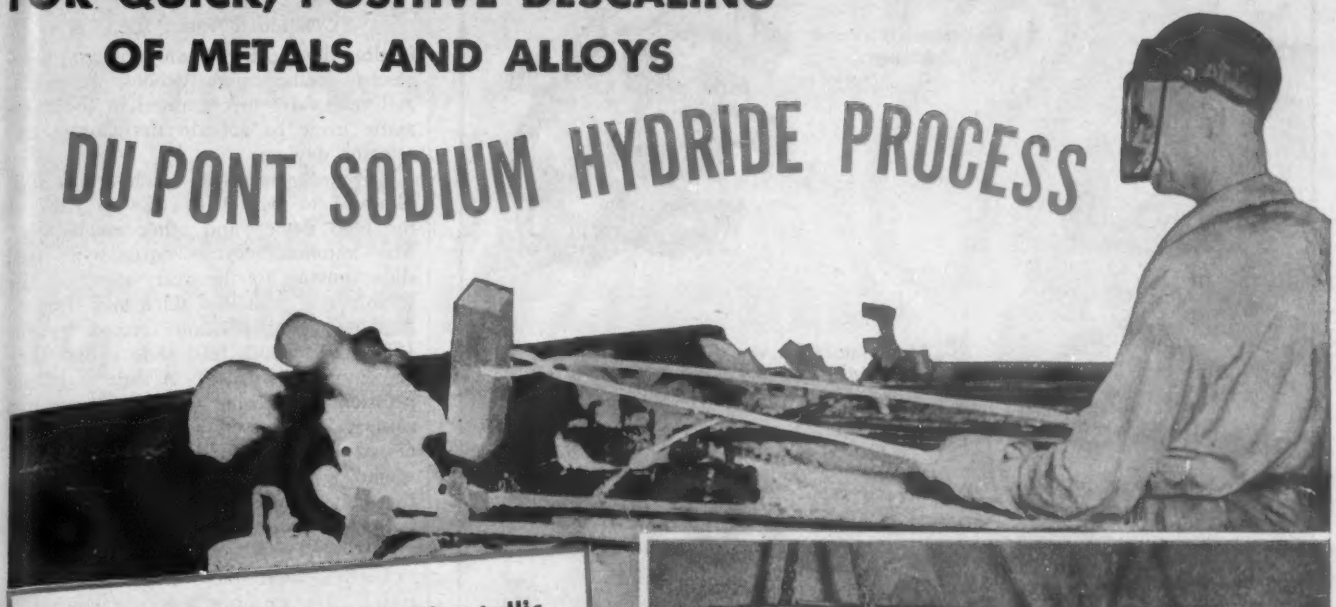
Stretch Forming New Metals

In the newer metals such as stainless steel and the great majority of aluminum alloys, stretch forming is the real answer whether in sheet or extrusions. Although occasionally a rather difficult extrusion such as a door frame can only be made by compression forming at the corners, (being too severe a bend to stretch form), stretch forming is used in the length since this could not be held accurately by the other means.

The contour forming machines are essentially simple tools, consisting of a swiveling hydraulic cylinder for maintaining a constant pressure either during rolling or stretching regardless whether the ram is being pushed in or pulled out, and a revolving table which is built to give a variety of speed. Speed variation is necessary because of the position of the material on the table, and because various materials stretch best at different speeds. The swiveling hydraulic cylinder is guided by heavy shaper type ram which keeps the side thrust off the main cylinder and provides ample means for attaching jaws or tooling at suitable heights without causing off center loads. The slide is locked during compression forming and free to move horizontally in stretch forming. Original tools were made with "T" slotted tables which, however, proved less satisfactory than steel tables with evenly spaced drilled and tapped holes for attaching form blocks. Occasional breakage under tension is not serious in the lower tensile materials, but can be serious in high tensile materials if not properly guarded.

FOR QUICK, POSITIVE DESCALING OF METALS AND ALLOYS

DU PONT SODIUM HYDRIDE PROCESS

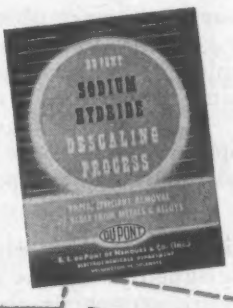


DESCALES: Alloy Steels • Bimetallic Sheet and Strip • Brazed and Welded Articles • Chrome-Nickel Steels • Chrome Steel • Cobalt-Nickel Steel • Composite Sheet • High-Speed Tool Steels • Copper • Inconel • Nickel • Nichrome • Monel

The new Du Pont Sodium Hydride Descaling Process comprises a simple arrangement of equipment and chemicals to carry out a prescribed treatment for production of clean, bright metal surfaces free of scale and smut. The descaling treatment can be carried out on finished articles or during processing into stock. Different grades can be treated simultaneously. A large volume of work can be handled in a simple, compact treatment. And descaling time is usually less than with most other commercial methods.

This Du Pont patented process is available without royalties or license to manufacturers in the U. S. Du Pont technical men are available for engineering assistance in the selection of suitable equipment, starting new units and training personnel in the operation and maintenance of the bath. Complete detailed information can be obtained by writing to E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington 98, Delaware.

BUY VICTORY BONDS... AND HOLD THEM!



SEND FOR THIS BOOK

Just released, "Du Pont Sodium Hydride Descaling Process" describes and illustrates this new development. For your copy—

⬇ Clip this Coupon

Please attach to company letterhead.

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department
Wilmington 98, Delaware 8-12

Please send "Du Pont Sodium Hydride Descaling Process."

Name_____

Firm_____ Title_____

Address_____

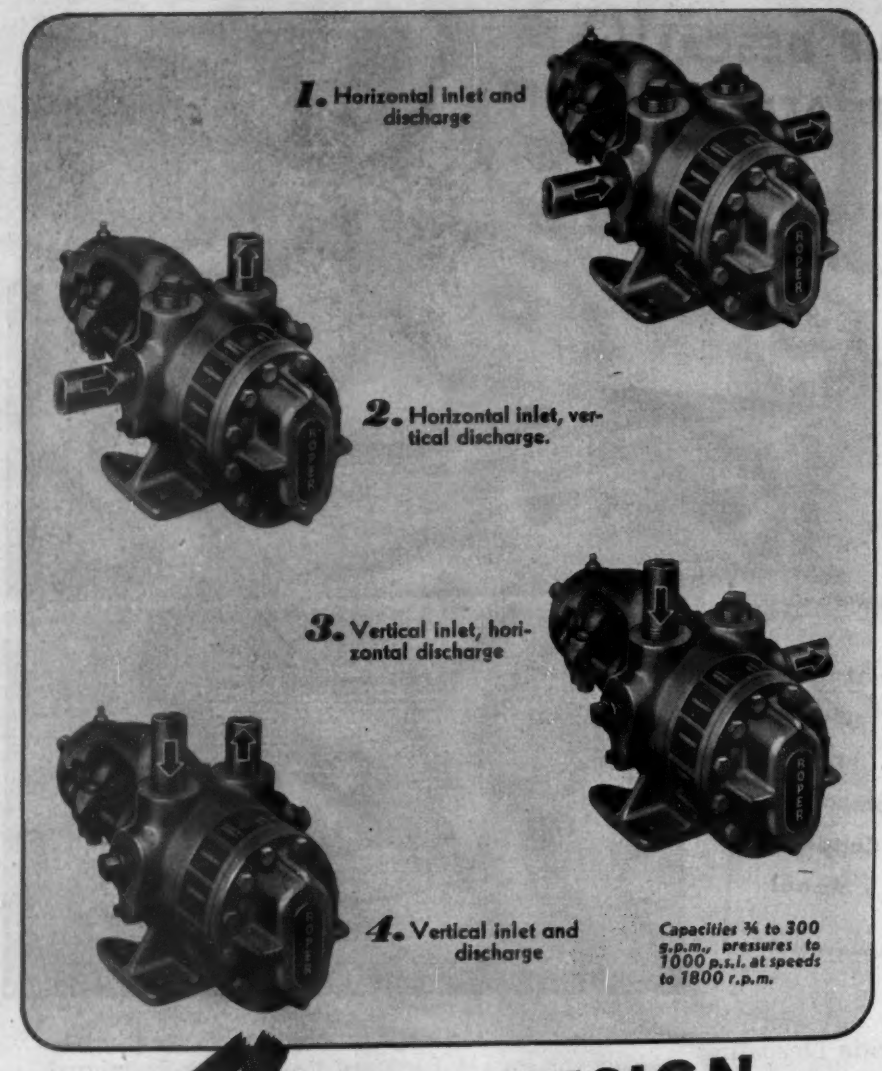
DU PONT

CHEMICALS and PROCESSES

for METAL TREATING

DU PONT REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY


1. Horizontal inlet and discharge
2. Horizontal inlet, vertical discharge.
3. Vertical inlet, horizontal discharge
4. Vertical inlet and discharge
Capacities ¾ to 300 g.p.m., pressures to 1000 p.s.i. at speeds to 1800 r.p.m.

4 PORT DESIGN

CUTS INSTALLATION TIME

ON ROPER PUMPS

● Before you replace your worn out or obsolete rotary pumps, it'll pay you to get full details on the Roper line today. For example, the Roper 4-port design offering 8 different piping connections will help you cut installation costs. 4 piping arrangements are illustrated with pump operating clockwise . . . 4 other arrangements are possible with pump operating counter clockwise.

Roper pumps run quietly and efficiently in either direction. They are designed along the correct hydraulic principle and built compactly to fit a wide range of application and mounting conditions.

Send for Catalog with Complete Information on Roper Pumps

GEO. D. ROPER CORP., 442 Blackhawk Park Ave., Rockford, Ill.

PUMPS ESPECIALLY ENGINEERED TO FIT YOUR REQUIREMENTS

ROPER Rotary Pumps

BUILDERS OF PUMPS FOR MANUFACTURING, MARINE, PETROLEUM AND PROCESS INDUSTRIES

Checking Piston Rings

(*Concluded from Page* 114)

feeding device. Electronic circuits, photoelectric cells, microswitches, solenoids, and relays are incorporated in the automatic cycle to actuate the gaging and selector devices.

In Fig. 2, top of the machine has been removed to permit a close-up view of the feed device and other mechanisms. The automatic cycle starts with feed slide moving to the rear, selecting the bottom ring from the stack and carrying it into gaging position formed by the 180° arcs in both feed slide and stationary compression plate. A slide and compression plate come together, the piston ring is compressed so that the gap is closed and the width of gap is determined. A deviation of 0.001-in. from the master can be detected.

Light Penetrates Clearance

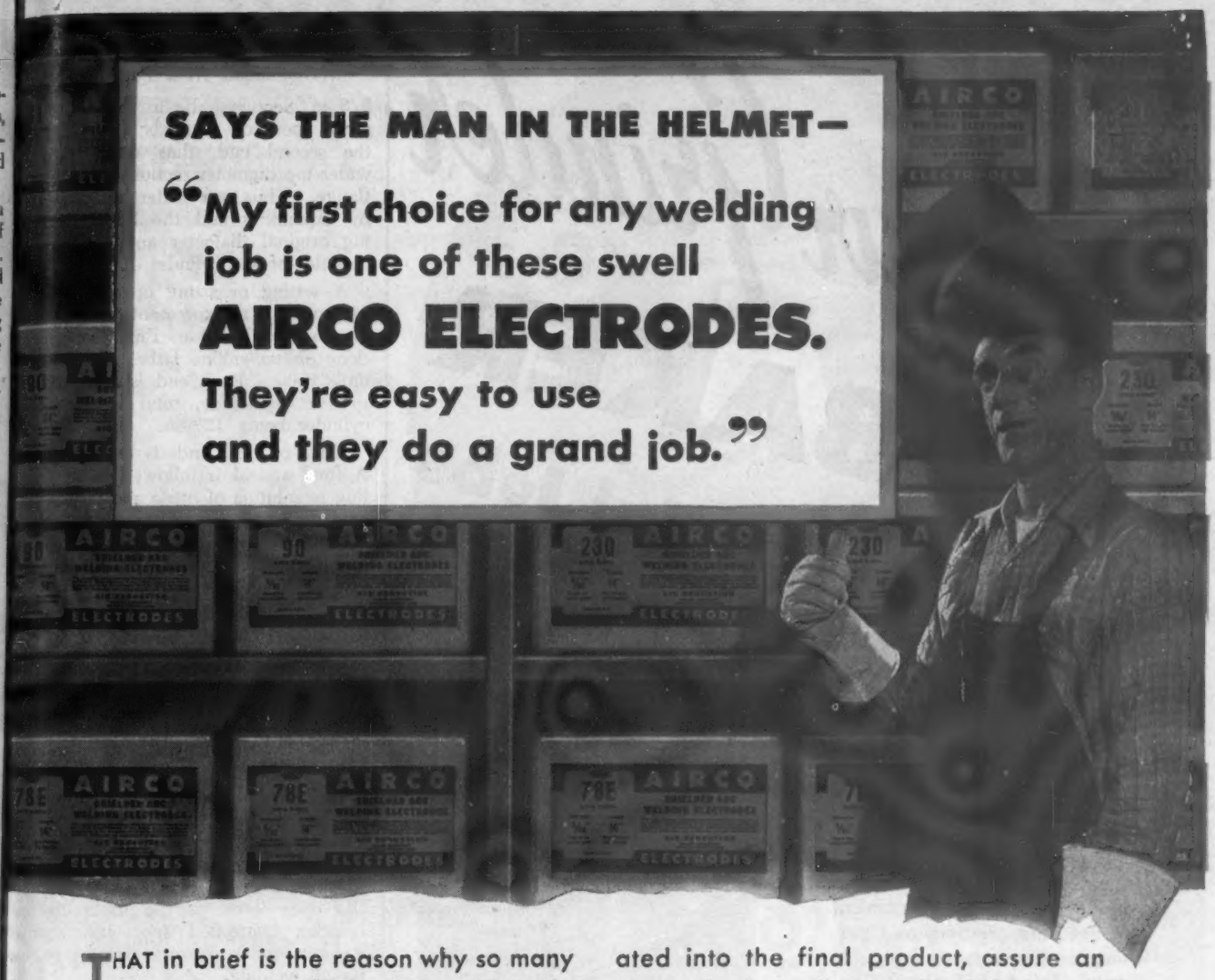
Vertical feed spider then descends on piston ring, pushing it into a constantly rotating master ring. Rollers on the ends of the spider fingers assist in properly positioning the piston ring, which is opened to its normal operating position. A concentrated beam of light projected through an optical system scans the outside periphery of the piston ring where it is in contact with the master ring while it makes slightly more than a complete revolution. If the ring is not sufficiently light-tight at any point on the periphery, light penetrating through the clearance between piston ring and master ring energizes a photoelectric cell which in turn sets up a holding circuit by means of a relay. This relay is not energized if the piston ring is acceptably light-tight and the check is accurate to within 0.0001-in. Thus a clearance of 0.0002-in. will be accepted, while one of 0.0003-in. will cause the ring to be rejected. The device can be set for any desired tolerance.

Inspected ring revolves with master ring while the feed slide returns to original position, picks up another ring and carries it through the gap-checking operation. Then, as this second ring is injected into the revolving master ring, the previously inspected ring is ejected on to two solenoid operated selector shutters or trap doors. If the ring is acceptable, both shutters remain closed, and the ring slides on through and out of the front of the machine on to a rack.

If ring is rejected because of either periphery or gap, selector shutters permit it to fall by gravity into reject stations on the sides of the machine. A spring-loaded clutch throws driving mechanism out of gear if machine jams due to piston rings being laced together while loading into feeding mechanism.

—o—

Special magnetic-strictive properties have made nickel tubing useful for underwater sound detectors. Both Sangamo Electricity Co. and Astatic Corp. also use 18-8 stainless in making the Navy units.


SAYS THE MAN IN THE HELMET—
"My first choice for any welding job is one of these swell
AIRCO ELECTRODES.
They're easy to use and they do a grand job."
AIRCO
ELECTRODES

THAT in brief is the reason why so many welders prefer Airco Electrodes for every welding job. For, in addition to meeting the metallurgical and mechanical requirements of each specific job, Airco Electrodes have those easy-working features that enable the welding operator to meet output schedules consistently.

After exacting laboratory trials each new Airco electrode is thoroughly pretested for working ease and efficiency by welding operators of varying skill and experience. Their suggestions, incorporated into the final product, assure an electrode that will rate high with the vast majority of operators.

* * *

SEND FOR FREE CATALOG

—which gives detailed information on Airco's complete line of shielded arc electrodes for every welding job. Address your local Airco office or Dept. S, · Air Reduction, General Offices: 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., General Offices: Houston 1, Texas.

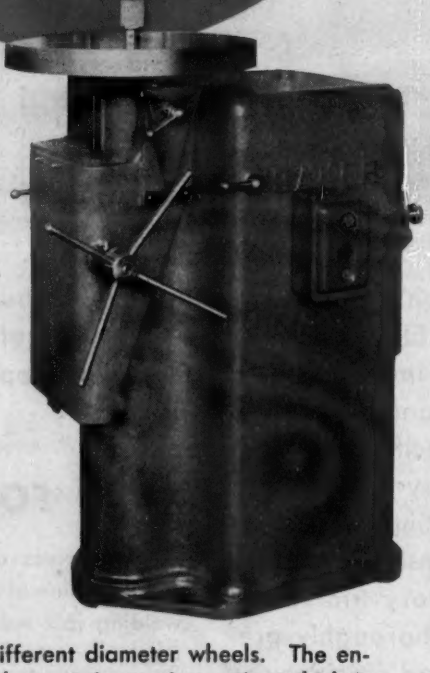
AIR REDUCTION AIRCO

OFFICES IN PRINCIPAL CITIES

Weld with

AIRCO **ELECTRODES** FOR BETTER WELDS AND EASIER WELDING

Contour Grinder by BAKER For Those Special Jobs



In addition to the BAKER line of drilling and key-seating machines we offer a simple design grinder for rapid, economical and accurate grinding and polishing of contours or irregular shapes. This BAKER No. 3 Contour Grinder is arranged with a vertical spindle mounted on large, precision, anti-friction bearings. The spindle is driven by a Vee Belt from a standard motor mounted directly to the rear of the spindle assembly, and fully enclosed in the main column of the machine. Three changes of speed are provided from the Vee Belt drive to furnish the machine with proper speeds for different diameter wheels. The entire spindle assembly has an up and down reciprocating action which is one of the main features of the machine and gives a much better grinding action, prevents shoulders from forming on the wheels and gives them much longer life. Provision is made for disengaging this reciprocation when dressing the wheels and wheels can be quickly changed when necessary. The entire assembly is guarded for protection against grindings and dirt. This BAKER machine is highly practical and economical for the hand grinding of a class of work for which other types of grinders are not adapted. Write today for further information and specifications contained in the BAKER Bulletin on this No. 3 Contour Grinder.

BAKER BROTHERS
Incorporated
TOLEDO, OHIO, U.S.A.

Drawing Stainless Cylinder

(*Concluded from Page* 117)

5/8 in. Sectional die in the final maj press operation expands 1 9/16 in. the second end, thus duplicating t wider top diameter section, including t flange. Thus one wider end is form by expanding and the other by hol ing original diameter and reducing r mainder of the cylinder.

A setting or sizing operation follow to prove all measurement, tolerance b ing held at 0.010-in. Final trimming done on an engine lathe; rough trim on a press. Each end is final trimme to size separately, total length of t cylinder being 12½-in.

Edge on both ends is beveled at 45 A final anneal is followed by vat pic ling in solution of nitric and hydrofluor acid for 5 to 8 min. After scrubbing wi sand on a sponge, rinsing in plain wat and gaging for size, the cylinder finished.

Inner cylinders for ignition tubes a made of stainless primarily to preve corrosion by coolant water. Assemble with an outer jacket, a stainless ste rod is spirally wound over the inn cylinder, water flowing around the tub in the space provided at considerabl velocity for cooling efficiency.

In assembly, stainless steel nipples a welded to the outer cylinder to for water cooling connections (Fig. 2 Anodes and vacuum seals are attache to mild steel headers and pressed int the open ends of the inner cylinde Ignition controlled spot and seamle welders under a water spray are use for all welding.

Fuse Specifications Listed In Catalog

A new 32-page catalog on cartridg and plug fuses has been published b General Electric Co.'s Appliance & Mer chandise Department, Bridgeport, Conn It contains full specifications on all fuse in the General Electric line and muc other fuse information that will be o interest and value to all users.

Detailed descriptions are given of th construction of non-renewable and re newable cartridge fuses, Silvend fuse and Pyrex plus fuses. Different part of the fuses are illustrated and described and the purpose of each part also i outlined.

Three chapters of general interest als are included. One deals with operatio of fuses and contains a technical descrip tion of short circuits, normal overloads, abnormal overloads, time-current char acteristics of fuses and high interrupting capacity. The other two deal with fuse history and fuse care. Fuse history i traced from the beginning of the elec trical era. Photographs show early wir fuses and early plug fuses. Last chapter on care and maintenance of fuses give practical suggestions for keeping fuse in good condition.

DON'T BE PENNY-WISE AND POWER-FOOLISH

You'll want all the production capacity possible from new, improved electrical equipment. Then don't let inadequate wiring rob you of equipment performance you pay for. Assure sufficient current for efficient operation of future electrical apparatus.

Remember, wiring won't stretch. Check up on your wiring plans *now!* It's far wiser to change blueprints than risk costly alterations later. This is the time to call in consulting or plant power engineer—electrical contractor or power salesman. They'll advise *foresighted* wiring. Anaconda Wire & Cable Company, Subsidiary of Anaconda Copper Mining Company. General Offices: 25 Broadway, New York City 4. Chicago Office: 20 North Wacker Drive 6. Sales Offices in Principal Cities. 45811

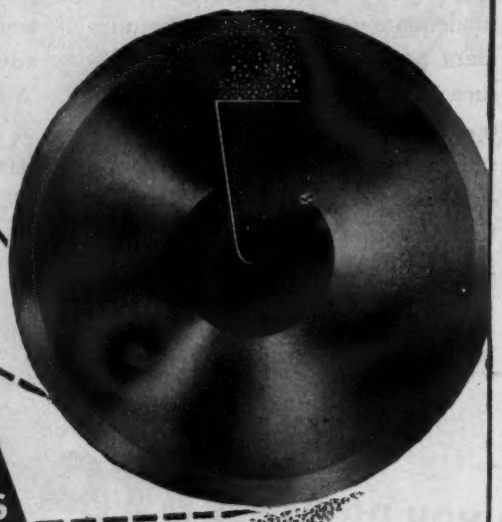
Get the performance you pay for in modern equipment—

Wire ahead

You wouldn't accept equipment that performed only part way—then why let inadequate electrical wiring cut production efficiency?
HELP BRING VICTORY SOONER
. . . BUY MORE WAR BONDS

ANACONDA WIRE & CABLE COMPANY

clean 'em WELL..
clean 'em FAST..
with PANGBORN AIRLESS ROTOBLAST*



NO matter how large or small a casting may be . . . no matter how simple or intricate its design or whether it is tough or "fragile" . . . no matter what kind of metal or alloy it is made of—it can be economically cleaned on a production basis by the Pangborn Airless ROTOBLAST Method.

Pangborn engineers have had the kind of experience that makes it possible for them to go right to the heart of the toughest foundry problems—and come up with the most efficient and economical solution. They have developed special basic equipment to meet many different cleaning needs, with handling methods geared to individual plant production lines—saving countless hours of handling, improving the uniformity of finishing, reducing rejects and lowering cleaning costs.

Pangborn ROTOBLAST Barrels, Tables, Cabinets and specially designed installations are cleaning castings better, faster and cheaper in foundries in every part of the country. "Come to Pangborn" for bulletins and specific information about the benefits of Pangborn ROTOBLAST Method for *your* foundry.

*Trademark of Pangborn Corporation

PANGBORN

WORLD'S LARGEST MANUFACTURER OF BLAST CLEANING AND DUST COLLECTING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

Strip Templets

(*Concluded from Page* 119)

swung to the new position at exa moment tracing unit is directly abov pivot point.

Fig. 4.—To overcome difficulty shape cutting a part so narrow that th templet tracing unit would not have suf ficient clearance between the two side of a templet made in the usual way, th templet is made in four sections. Tw rounded end sections are riveted securel to the base, while the two side section are riveted to pieces of light-gage steel trimmed where necessary to conform t the shape of templet. These pieces ar attached to base plate by a pivot at on end. Thus, one side section can b swung out of the way while the tracin unit is following the other side.

Fig. 5 illustrates templet for cuttin sprockets. It consists of a base plate an two sheet-metal segments that can rotat around a pivot point located at the ex act center of the layout. To each sheet-metal segment is attached a formed templet strip that conforms to one section of the sprocket design.

The two segments are placed side by side, as shown in Fig. 5-a, and are held in place by loose rivets or pins inserted in holes made for this purpose. Cut is started with tracing unit operating on the templet strip attached to segment No. 1. After cut has progressed so that the tracing unit is operating on the templet strip on segment No. 2, the loose rivet is removed from segment No. 1 and it is swung around the pivot point to position shown in Fig. 5-b. The rivet is inserted through the hole in this position. As cut progresses, one segment after the other is rotated to a new position ahead of cutting action and, while guiding the tracing unit, is held in place by means of the loose rivet or pin inserted in a previously made hole.

Modern Heat Treating Practice

A series of five articles prepared by Arnold P. Seasholtz and appearing in the Sept. 3, 10, 17, 24 and Oct. 1, 1945 issues has been reprinted in the form of a handy pocket-size booklet. "Modern Heat Treating Practice" not only refreshes the reader on fundamentals of heat treatment but brings him up to date on the newer practices now employed in the metalworking industry. Copies may be obtained at 50 cents by addressing: STEEL, Book Department, 1213 West Third Street, Cleveland 13.

100 YEARS *Making strong the things that make America strong*

If you need Parts like these

...have you considered COLD-FORGING?

A great variety of metal shapes are produced on the same high-precision, high-production machinery that is used to cold-forge RB&W EMPIRE bolts.

Cold-forging gives you the maximum of all the characteristics you would undoubtedly want in such a product —

Strength. Cold-forging on RB&W equipment increases tensile strength; the grain is intensified, flow lines in the metal are preserved. The operation provides an automatic inspection of the material.

Accuracy. RB&W cold-forging machinery can work to close tolerances and produce parts of extreme accuracy and fine finish.

Economy. Such parts can often be produced at much lower cost, due to the high speed production and the virtual elimination of scrap waste.

THE LONGEST EXPERIENCE IN AUTOMATIC COLD-FORGING

This is RB&W's 100th year. The history of this company is also the history of automatic cold-forging, for it introduced the original automatic cold-heading machine and has since pioneered in the improvement of quality and the lowering of costs of fasteners and other parts which can be cold-forged.

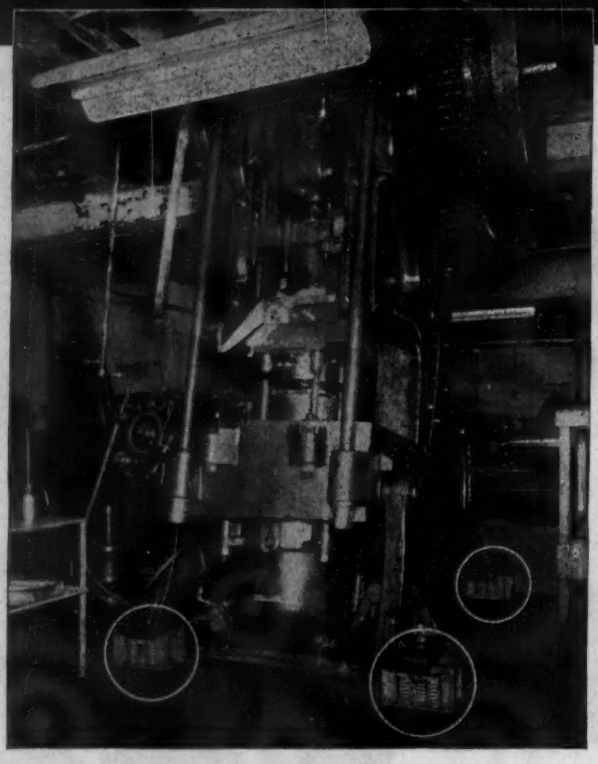
In planning new parts, consider the many metal shapes which can be produced by cold-forging and also that RB&W's experience and facilities make it your logical source of supply. At present, wartime commitments have largely monopolized those facilities; in designing for postwar, keep in mind the advantages of this method.

RB&W

Russell, Burdsall & Ward Bolt and Nut Company. *Factories at:* Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill. *Sales offices at:* Philadelphia, Detroit, Chicago, Chattanooga, Los Angeles, Portland, Seattle... with the industry's most complete, easiest-to-use catalog.

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Now is the Time to Isolate Costly Punch Press Vibration



Four Korfund Type SL/H Vibro-Isolators effectively absorb the shock from this Bliss 100 Ton Capacity Press

You can't operate punch presses without vibration. Whether you realize it or not, uncontrolled vibration takes a constant toll in building damage, machine breakdowns, accidents, spoiled work and lowered employee efficiency.

But there is no reason why you can't be protected from vibration. Vibration can be isolated completely—and economically—through Korfund Vibration Control.

And the logical time to take advantage of the simple, sure results of Korfund Vibration Control is while presses are shut down during your reconversion period.

Ask for a Korfund Vibration Control Engineer to recommend the proper isolators for your equipment. We have representatives in principal cities. In the meantime, ask for Catalog H-600.

KORFUND
VIBRATION CONTROL

THE KORFUND COMPANY, Inc., 48-37 32nd Pl., LONG ISLAND CITY 1, NEW YORK

Twin Production Lines

(*Continued from Page* 121)

turing layout, thus saving time and money in rearrangement, an accurate three-dimensional model, shown in Fig. 1, was constructed to ¼-in. to the foot scale. With models of men, machines, and conveyors, it was possible to see that material arrived at and flowed from work stations at the correct height for greatest ease in handling. In addition, all operators had sufficient working space, as standard height men models, 5 ft 8 in. high, were cast with arms outstretched and needed only to be pivoted at their work station in order to check required working area. Models also were used to solve problem of temporary storage space. By making a miniature layout and studying the crane handling facilities, maximum use was made of minimum space.

For quick and accurate chucking, many tools such as forming presses and collet chucks on turret lathes and thread millers were air operated; each was supplied from the plant system which supplied air at 105 psi. On all lathes, a flick of the control valve locked the shell in place. Machining was semiautomatic. Sample pieces were used as models for setting cutters. As not more than 10 per cent of the workers were skilled machinists, this speeded production and avoided poor individual setups.

Carbide Tipped Cutting Tools

Because of material hardness, cutting tools—with the exception of drills, saws, and thread mills—were carbide tipped. To keep machining costs at a minimum, multiple tooling was used extensively. For example, the vertical lathes used to rough turn the HVAR forging made five cuts simultaneously—three on the side, one on the nose, and one on the base—and removed up to 25 lb of metal in less than 1 min. The cut was approximately 0.200-in. deep; surface speed was 350 fpm. Rough turning lathes were equipped with 60 hp motors.

All incoming forgings were taken from an outside storage pile and passed through banks of infra-red ovens for drying, thus preventing moisture from clogging the nozzles of the shot blast machine. Two lines passed through these ovens, which were of the portable, floor type. There were four sections of 96 lamps each, with two parallel sections on each of the two lines. This permitted the greatest amount of flexibility as in case of only partial production, one bank could be switched off and drying done in the other. Lamps were of the standard 250 w, 110 v type, and reflecting surfaces were gold plated to insure maximum reflection for infra-red radiation.

Here lines separated. The HVAR line first passed to the initial shot blast which, done in a rotary type, air propellant machine, removed scale from the outside diameter and inside diameter of the cavity, cleaning projectile for loading and locating, and also increasing tool

For you NOW

Three new members of the RACO family . . .

RACO 8010 • RACO 9010 • RACO 10010

These are heavily coated all-position, reverse polarity electrodes for welding special high-tensile low alloy steels. Though new on the market their high quality is assured through our searching laboratory tests, and demonstrated on hundreds of practical jobs in shop and factory. When critical metals may be had for civilian goods, these electrodes will measurably assist you to meet post-war competition.

We will be glad to send you samples of RACO 8010, 9010 and 10010. Just write—

These electrodes comply with A.W.S. A.S.T.M. Specifications A233-45T, E8010, E9010, E10010.

The **REID-AVERY COMPANY**

INCORPORATED

DUNDALK BALTIMORE 22 MARYLAND

SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

PAGE *Stainless Steel* WIRE

PAGE stainless steel wire—round, flat or specially shaped—is today being used in fabricating hundreds of products which seem wholly unrelated to wire. New uses are constantly being found. And where wire is so used, it is effecting production short-cuts—reducing production costs.

From long experience, PAGE is often able to advise about applications—as well as supply the wire.

While specializing in stainless steel, PAGE also draws wire of high or low carbon steel, Armco ingot iron and special alloys. Shaped wire in section areas to .250″ square—widths to ⅜″.

If there is a possibility of using wire in the making of your product, it will pay you to . . .

Get in touch with Page!

ACCO

Monessen, Pa., Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

life in machining. Forging then was sawed to length on circular saw equipped with a hydraulic locator and centered on a rotary mandel vertical type centering machine, as shown in Fig. 5. This type of machine was installed to insure concentricity in future operations. After being centered on a centering machine, the forging was rough turned on vertical lathes and passed to a high frequency induction heating generator. (Tooling arrangement is sketched in Fig. 3.)

Induction heating raised nose to a red heat for forming in 24 to 27 sec. Generator, a mechanical type of 200 kw capacity, operated at 3000 cycles. Any other method of heating would have required a much larger amount of floor space, a larger labor force than the one-man operation used with induction heating, and also would have required a much longer heating cycle. After heating, work was nosed on a 250-ton mechanical nosing press as in Fig. 6.

Maximum Qualities Obtained

Furnace heat treated projectile to point (on the HVAR) where maximum physical qualities were obtained and the shell could still be machined. As the forgings, which were bought from several outside suppliers and which came from a central stockpile, varied in chemical properties, furnaces were adjusted for each batch. Each shipment was separated by heat or code number appearing on pieces. Ten per cent of each heat was checked dimensionally. Pilot pieces were run through rough machining and heat treatment and checked to obtain physical properties. A sample forging was micro and macroetched to determine homogeneity and internal structure. Appearance of all etches from the spinner had to show electric furnace quality steel, in conformance with specifications.

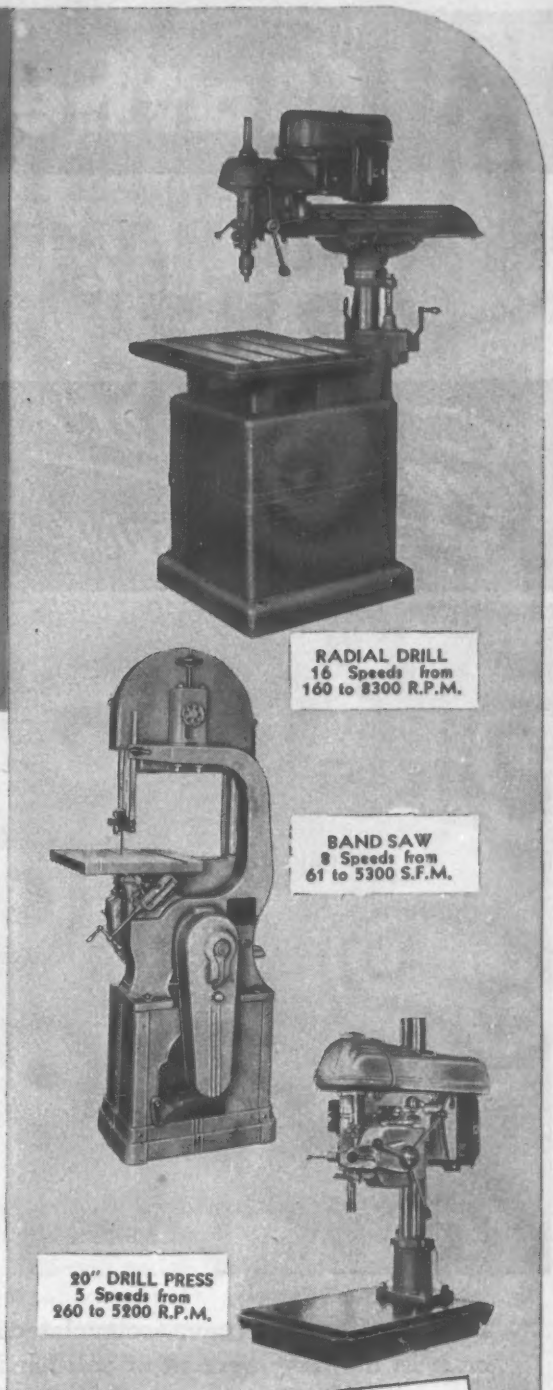
A heat treat and oil quench operation hardened the HVAR to about 520 brinell, which was maximum for materiel under existing heat treating conditions. Tempering operation reduced hardness to 240 brinell for machining. Oil in quench tank was maintained at 150° F maximum by evaporative type coolers. Six inner spray nozzles quenched cavity of forging at same time a propeller type agitator circulated oil around outside of the forgings to secure uniform cooling and to eliminate gas pockets. After tempering, forgings were lowered to room temperature in 20 min by forced air water mists.

Another shot blast treatment removed heat treat scale. The outside diameter was finish turned, the nose bore chamfered, and the base hole drilled to 2½ in. An inspector then weighed the piece, and indicated amount of overweight or underweight. In subsequent machining operations, tolerances were close, and the final weight was held within ¼-lb.

Handling time on lathes used for finish cuts was materially reduced by a specially designed tray, shown in Fig. 2, which

Walker-Turner

MACHINE TOOLS' WIDE SPEED RANGES CUT MACHINING COSTS!



RADIAL DRILL
16 Speeds from
160 to 8300 R.P.M.

BAND SAW
8 Speeds from
61 to 5300 S.F.M.

20" DRILL PRESS
5 Speeds from
260 to 5200 R.P.M.

● Using the *correct* cutting speed for every operation and material pays off in faster machining—fewer damaged tools and blades—cleaner, more accurate production. This all adds up to *lower cost per piece!*

Exceptionally wide speed ranges with ample adjustments between "high" and "low" enable Walker-Turner Machine Tools to cut costs substantially. The Radial Drill's jackshaft assembly and the Band Saw's backgearing and cone-pulley arrangement are examples of this advanced designing. Write today for detailed catalog.

WALKER-TURNER COMPANY, INC.
PLAINFIELD, N. J.

MORE FOR YOUR MACHINE-DOLLAR
with prices like these!

RADIAL DRILL—$352.50 less base and motor.

14" BAND SAW—$127.50 less base and motor.

20" DRILL PRESS—$255.00 less motor. (Slightly higher west of Rockies and in Canada).

walker-Turner
COMPANY, INC.
PLAINFIELD, N.J.
U.S.A.

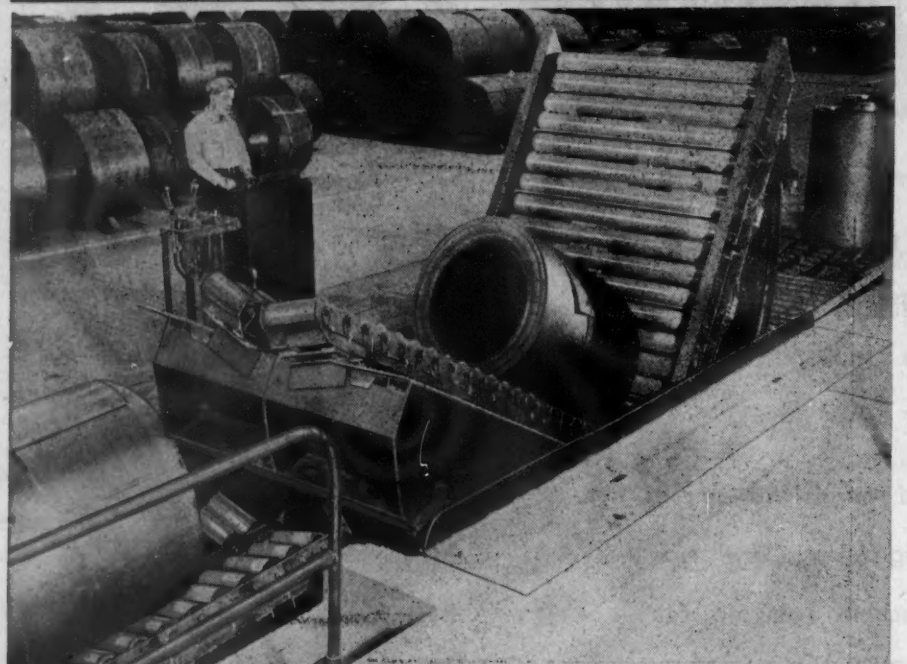
MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

Mathews

COIL HANDLING CONVEYERS

Engineered to serve Production



Mathews Engineers have accumulated many years of experience in the development of coil-handling conveyers. This concentrated effort has resulted in high-quality up-enders and down-enders, combination up-enders and side tilters, troughed roller conveyer, turntables, and tail pullers. There is a Mathews Engineer operating in your vicinity. He will be glad to show you what has been done in the handling of steel, brass, and aluminum coils. He will also give you data concerning the many other types of Mathews Conveyers which have been engineered to serve production.

MATHEWS CONVEYER COMPANY
ELLWOOD CITY, PENNSYLVANIA
SAN FRANCISCO, CAL. • PORT HOPE, ONT.
ENGINEERING OFFICES IN PRINCIPAL CITIES

pivoted on conveyer and counterbalance for ease of manipulation. Fabricated of light steel stock, it handled the 35 lb shell into or out of the machine in 7 sec, including chucking. Four arms with the same curvature as the shell casing fitted between rollers on the conveyor and extended back to a stop in line with chuck. Operator merely lifted the end, picked a shell from the conveyor, and slid it into chuck.

Base outside diameter and inside diameter threads were cut simultaneously on planetary type milling machines having the setup shown in Fig. 4. These threads had to be concentric so that, when projectile was assembled to rocket motor, there was no wobble in flight. Outside and inside diameter of the threads had to be concentric within 0.005-in., and squareness of outside diameter thread had to be within 1/1800 of a right angle to the shell axis. Every time a hob was ground, tools were preset in a cutter head by use of setting tools, and then mounted in machine. With slight adjustment for depth of thread, they were ready to turn out shells. Nose threads were cut on a similar machine, but here specifications were somewhat more liberal. Nose notches were milled in a specially designed machine having three belt driven milling cutters revolving at 290 rpm and spaced at 120° intervals.

Two Inspections Made

Two inspections were made on the finished product, one by company inspectors who weeded out defectives and shunted them to a nearby repair station and another by the Navy. A vapor degreasing operation, followed by painting, air drying and assembly, completed the manufacture. A fast drying lacquer paint was used so that the projectiles could go directly from air dryer to marking and assembly lines where shipping plugs and nose adapters were installed. All threads and exposed metal surfaces were greased with rust preventative before shipment.

With a few exceptions spinner head manufacture followed same pattern as HVAR. Head, however, was of a higher grade of steel and received a different heat treatment.

Automatic loader and unloader also was used on the degreasing machine on the spinner line. Shells came in on a conveyor from production line, were picked up automatically, carried through the degreaser, and unloaded on the other side.

Both lines occupied a total space of 42,685 sq ft, not including such auxiliary adjuncts as gage and tool grinding rooms, metallurgical laboratories, supervision and engineering offices, and temporary storage space.

—o—

The Arabian-American Oil Co. is developing plans for a 1000-mile pipeline from the Abqaiq field in Saudi Arabia to the Mediterranean. To cost about $125 millions, the line will have approximately a capacity of 300,000 bbl daily.

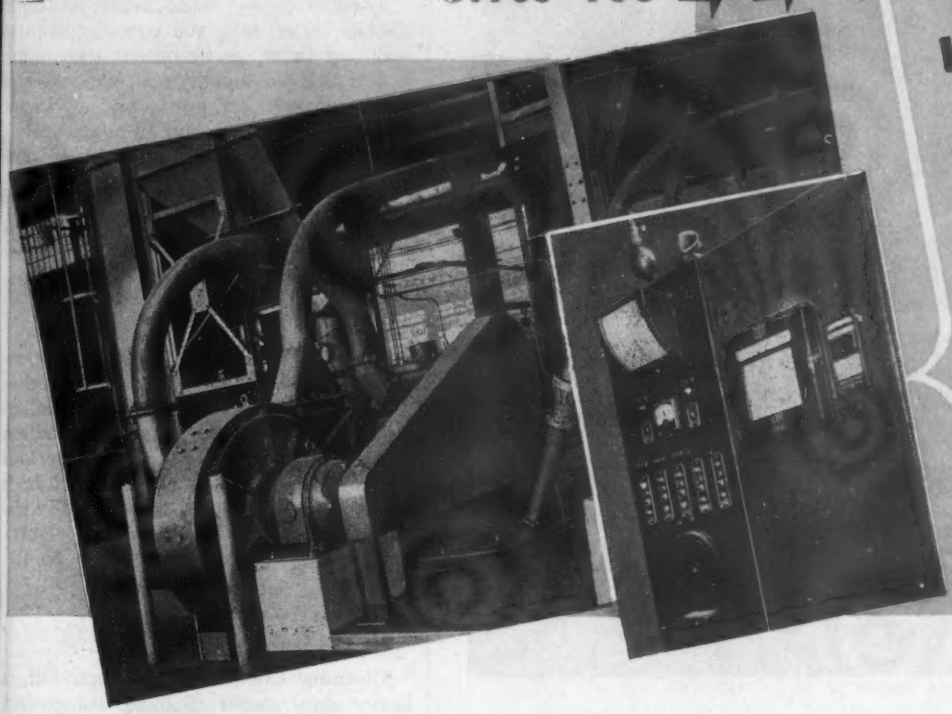
B&W Direct-Firing Pulverized-Coal System for Metallurgical Furnaces

Gives You

ONE-POINT FUEL CONTROL

UNIFORM FURNACE TEMPERATURE

ECONOMICAL OPERATION



Close regulation of coal-air ratio and volume —an important feature in the operation of most metal-heating furnaces—is *automatically* obtained with the B&W Direct-Firing Pulverized-Coal Circulating System by controlling the rate of coal feed to the pulverizer so that it is proportional to the primary-air flow.

Once the controller is adjusted for a specific heat, both coal and primary air are always properly proportioned for most efficient combustion and with minimum attention of the operator, the pulverizer supplies coal of proper fineness to the circulating loop at the same rate it is being used by the burners at any particular moment. A substantially constant density of coal and air is assured in the circulating line at all times.

This automatic control provides the same flexibility of multi-furnace operation as with gas or oil—burners may be turned on or off, and adjusted as desired.

Simple, dependable, and convenient, this one-point automatic control is but one of several cost-saving features that make B&W pulverizers so economical for direct-firing of metallurgical furnaces—with and without a circulating system—where high output of high-grade metal products is of prime importance.

Write for *"Pulverized-Coal Firing of Metallurgical Furnaces,"* a 14-page booklet discussing this subject in detail.

Water-Tube Boilers, for Stationary Power Plants, for Marine Service . . . Water-Cooled Furnaces . . . Superheaters . . . Economizers . . . Air Heaters . . . Pulverized-Coal Equipment . . . Chain-Grate Stokers . . . Oil, Gas and Multifuel Burners . . . Seamless and Welded Tubes and Pipe . . . Refractories . . . Process Equipment.

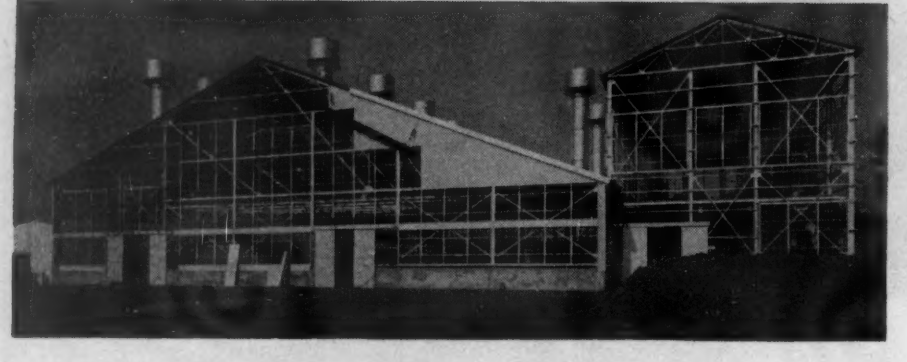
BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
85 LIBERTY STREET, NEW YORK 6, N.Y.

PM-100

Added Advantage

FOR FABRICATED STEEL CUSTOMERS



INGALLS' active working interest in many branches of the steel industry gives this company first-hand practical knowledge of the problems facing users of fabricated steel. Our continuous search for improved methods in the manufacture of tanks, barges, workboats and other "production line" items, in building ships and in actual field erection work, often leads to developments advantageous to fabricated steel customers. Improved methods of construction, fabrication or design, discovered in solving a shipbuilding headache, may be applied to your problems in building a bridge or a skyscraper. Look to Ingalls for the latest developments and economies in utilizing welding in the production and use of fabricated steel.

THE INGALLS IRON WORKS COMPANY, THE INGALLS SHIPBUILDING CORPORATION, The Steel Construction Company, Birmingham Tank Company. Offices at BIRMINGHAM, New York, Washington, Pittsburgh, New Orleans. Fabricating plants at Birmingham and Pittsburgh. Shipyards at Pascagoula, Miss. and Decatur, Ala.

INGALLS STEEL

NEW PRODUCTS

Welding Electrode — Shielded arc electrode for welding mild steel, Fleetweld 47, offers low spatter loss, easy slag removal, and good restriking characteristics. May be used with either alternating or direct current. Available in various sizes. Lincoln Electric Co., Cleveland 1. ST370

—o—

Sweatband — Made from synthetic sponge 7½ in. long and covering greater width of brow, an absorbent sweatband is designed for foundrymen, welders and other workers on hot jobs. It keeps sweat out of the eyes and off goggles, thus helping to reduce possibility of accidents resulting from blurred vision and can be sterilized for continual use. American Optical Co., Southbridge, Mass. ST396

—o—

Coolant and Strainer — For easy installation on grinders, lathes and other machine tools, Metex Model G, nonclogging coolant and cutting oil strainer, offers cleaner fluids and longer periods of uninterrupted strainer service. It is constructed of knitted fabric and wire. Strainer Products Corp., 75-77 North Willow street, Montclair, N. J. ST404

—o—

Cleaning Compound — Steam-Off, a heavy duty steam cleaning compound, removes heavy grease and dirt from iron and steel surfaces, concrete, brick, and structural materials. It combines quick cleaning energy with ability to soften water, and leaves no film, curds, water spots, or streaks. A strong solution of compound removes unwanted paint as it cleans. Turco Products Inc., 6135 South Central avenue, Los Angeles 1. ST394

—o—

Rubber Cement — Nonthermoplastic, water and aromatic oil-resistant adhesive, Plastilock 500, is used for bonding metals, wood, plastics and ceramic materials to themselves or to each other. Adhesive shear strength is 3250 psi, and tension strengths of 4000 psi have been reached. B. F. Goodrich Co., Akron, O. ST365

—o—

Signal Relay — Weighing only 1¾ oz, R-B-M Type 23000 Signal and Communication Relay is suited for applications requiring resistance to vibration, humidity, and temperature extremes. Approximate dimensions are 2⅛ in. long, 1½ in. high, ⅞-in. wide R-B-M Mfg. Co., division of Essex Wire Corp., Logansport, Ind. ST367

FACTS AND FIGURES ON NEW AND EXPANDED FACILITIES OF THE STEEL INDUSTRY ARE NOW REVEALED IN . . .

"Steel Expansion for War"

By W. A. HAUCK

[An official report by Mr. Hauck for the War Production Board]

192 pages of pertinent data on both industry and government financed projects. Detailed schedules on capacities, location and cost. Including 148 photographs.

• Mr. Hauck has been with the Steel Division since its inception in June, 1940, then under the National Defense Advisory Commission (predecessor to WPB). Assigned to the task of expanding and balancing steel capacity for war, Mr. Hauck has inspected both large and small plants all over the United States. He prepared several official reports which lead to the addition of 10,000,000 tons of integrated steel capacity, plus over 5,000,000 tons of capacity by the expansion of existing facilities.

"STEEL EXPANSION FOR WAR" is an official report on this gigantic undertaking prepared for the War Production Board and other government agencies. A large part of the data will be presented before the Senate when it takes up the problem of disposing of billions of dollars worth of surplus government-owned war plants.

Much heretofore unpublished information is presented on new and revamped facilities of hundreds of plants, including those in the ore, ore transportation, coal and coke, refractory, ferro alloy, scrap, foundry and forging industries. The report provides details on types of products, capacity increases, plant locations, costs, etc. Included are 148 photographs, plus charts and tables.

PRICE $2.00* SINGLE COPY

ORDER YOUR COPY NOW..

PRICE SCHEDULE*

1- 9 copies	$2.00 each
10-24 copies	1.80 each
25-49 copies	1.70 each
50-74 copies	1.60 each
75-99 copies	1.55 each
100 or more	1.50 each

*Please add 3% state sales tax on orders for delivery in Ohio.

STEEL—Book Department
Penton Building, Cleveland 13, Ohio

Please send.....copies of "STEEL EXPANSION FOR WAR," by W. A. Hauck, postpaid.

☐ Payment is enclosed as per price schedule at left.

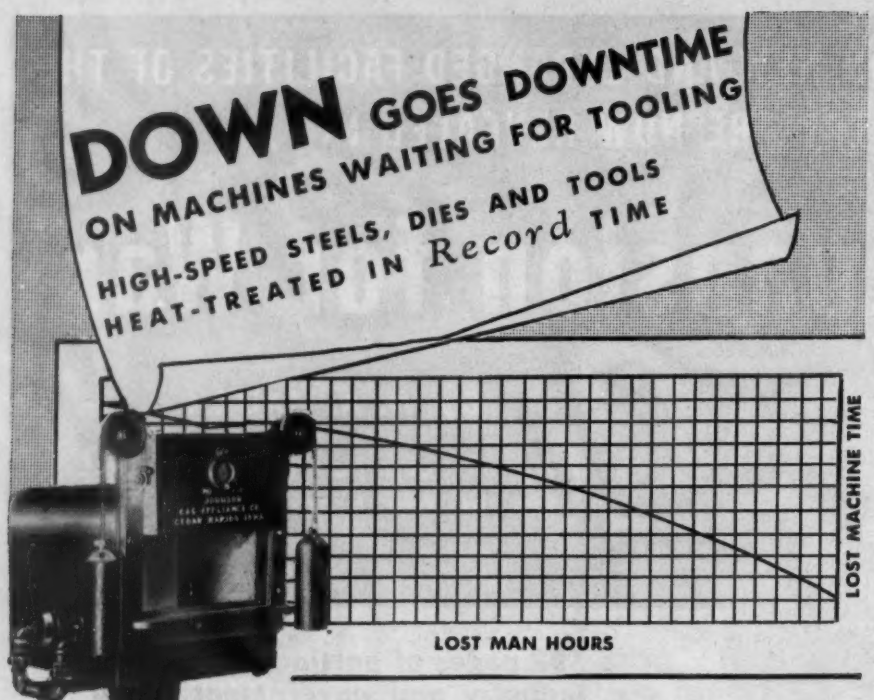
☐ Send invoice to company as shown below.

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....



Reduce Toolroom Bottlenecks with *Quick Acting* JOHNSON Furnaces

No. 130A

With Efficiency the keynote in profitable post-war production, ONE sure way to cut wasted time is to install Quick Acting JOHNSON Furnaces in your toolroom and shop. These compact, powerful, easily controlled units reach operating temperatures FASTER to get the job done quickly and economically. Designed primarily for high-speed steels . . . equally efficient for heat-treating ANY steel tools, dies or small metal parts. Full information on request.

Ready for *Action* on TWO WEEKS' DELIVERY

Plan now to take advantage of lower heat-treating costs. Order your Johnson Quick Acting Furnaces Today!

No. 130A HI-SPEED FURNACE. Features counterbalanced door opening upwards. Firebox 7¾x13x16½. Available with 4 or 6 burners for temperatures 1400-2000°F. or 1800-2400°F.
4-Burner Unit shown . . . . . $295.00 *F.O.B. Factory*
6-Burner Unit . . . . . $325.00 *F.O.B. Factory*

No. 120 HI-SPEED FURNACE. Reaches 1500°F. in 5 Minutes. 2300°F in 30 Minutes. Firebox 5x7¾x13½.
$129.50 *F.O.B. Factory*

No. 70 HI-SPEED BENCH FURNACE. Delivers 2250°F. in 30 Minutes from a COLD START. Firebox 5x7¾x9.
$89.50 *F.O.B. Factory*

All furnaces shown complete with Carbofrax Hearth, G.E. Motor and Johnson Blower

No. 120

JOHNSON GAS APPLIANCE CO.
573 E. AVENUE N.W. — CEDAR RAPIDS, IOWA

WRITE FOR CATALOG!

No. 70 Bench Furnace

Quick Acting Johnson Furnaces

New Literature

CHEMICAL FEED SYSTEMS

By Milton Roy Pumps, 1300 East Mermaid avenue, Chestnut Hill, Philadelphia 18.

Bulletin 451 describes packaged units for feeding chemicals directly into boiler drums and into boiler feed water lines to prevent scale, control alkalinity, remove dissolved oxygen, insuring against corrosion and pitting.

—o—

ROTARY DRYER

By General American Process Equipment Division, General American Transportation Corp., 420 Lexington avenue, New York 17.

(A 6-page, 2-color folder, No. 52-415, illustrated.)

Entitled "Design and Construction of Louisville Rotary Dryers," folder describes in detail the building of a rotary dryer. Among its advantages are: Machine may be of standard or special design; and each is equipped with self-aligning rollers.

—o—

FELT WHEELS AND BOBS

By Divine Brothers Co., Utica 1, N. Y.

Folder describes Dico felt wheels and Dico felt bobs. Features mandrel-mounted felt bobs, recently developed and available in many sizes and shapes for use in portable air and electric grinders and flexible shaft equipment.

—o—

ELECTRICAL AIRCRAFT ACCESSORIES

By Pesco Products Co., Division of Borg-Warner, 11610 Euclid avenue, Cleveland 6.

Booklet contains section drawings, illustrations and data covering fuel, hydraulic and air pumps for installations employing 3-phase, 400-cycle, 208-volt power.

—o—

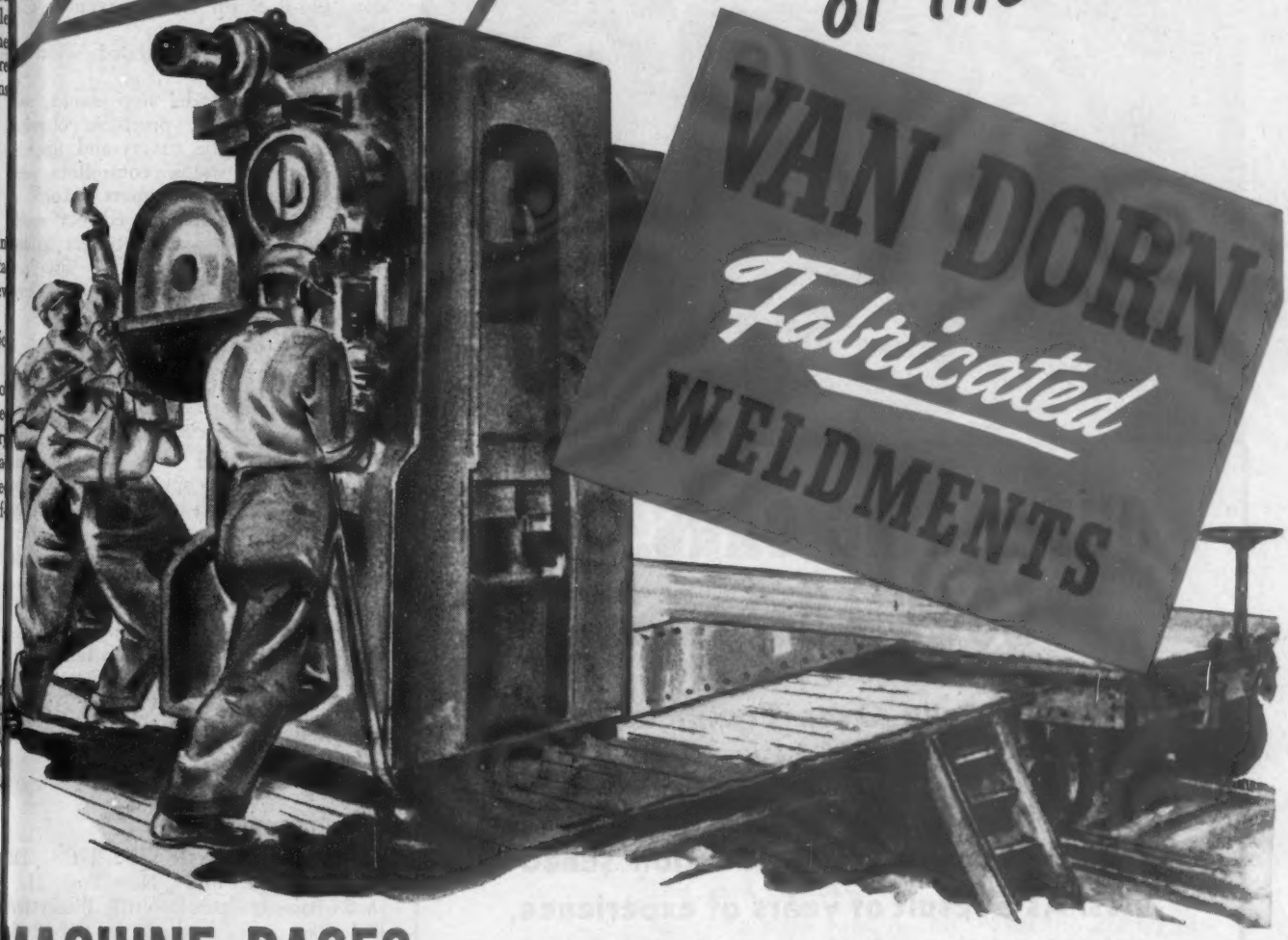
CORROSION OF CAST IRON

By Gray Iron Founders' Society, Cleveland and Washington.

(28-page pamphlet with tables. Cost $1.)

Entitled "Cast Iron in the Chemical and Process Industries," pamphlet contains data on corrosion rates of cast iron exposed to action of substances commonly handled by chemical structures. Results of laboratory and plant tests with more than 300 corrosive media in an alphabetical range from acetic acid to zinc sulphate are shown. Also includes four tables listing many chemicals regularly handled by cast iron pumps and valves and those resisted satisfactorily by high silicon irons. Factors dictating cast irons for corrosive service, availabil-

Less Weight... but that's only part of the story!



MACHINE BASES OF STRONGER, SMOOTHER CONSTRUCTION —BETTER DESIGN, MORE MODERN APPEARANCE

Welded structures, designed and built by Van Dorn, offer ruggedness, adaptability, weight saving, economy, modern design. Van Dorn has complete fabricating and manufacturing facilities . . . experienced design engineers . . . specially trained workmen . . . ready to meet your requirements. Your inquiry will receive prompt, careful attention.

Builders of better iron and steel products for 75 years.

THE VAN DORN IRON WORKS CO.
2685 EAST 79TH STREET CLEVELAND 4, OHIO

COKE OVEN EQUIPMENT

QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

Other ATLAS Products

Ore Transfer Cars

•

Scale Charging Cars

•

Electrically Operated Cars for Every Haulage Purpose

Locomotives for Switching and Interplant Haulage

•

Turntables

The ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1100 IVANHOE RD. CLEVELAND, OHIO, U. S. A.

ity of material, design for chemical
dustry equipment, and many spec
applications are discussed.

—o—

ELECTRIC TIMER

By C. H. Stoelting Co., Industrial Di
sion, 424-P North Homan avenue, C
cago 24.
(Bulletin No. 1100, illustrated, with d
grams.)
Describes table model stop clocks, w
model stop clocks, precision chron
scopes, combination timers and impul
counters, stop watch controllers, a
spring wound X-ray timers. Includ
circuit diagrams showing correct met
ods of connecting various timers in t
circuits.

—o—

KNITTED WIRE

By E. H. Titchener & Co., Walnut str
at Erie R. R., Binghamton, N. Y.
(A 2-page, 2-color circular.)
Describes types of wire knitted fr
single strands of spring steel, spri
stainless, and spring bronze wire. Amo
its advantages are: Available in vario
diameters and lengths, with varying d
grees of flexibility; can be shaped to r
tain almost any desired position; can b
made from wire selected to resist he
corrosion, or wear; is high in tensile a
crushing strength and light in weigh
and is easy to handle. Circular also li
some applications.

—o—

FILTER PAPER

By Carl Schleicher & Schuell Co., 11
118 West 14th street, New York 11.
(A 24-page bulletin, No. 67, illustrated
Describes new method developed f
quantitative evaluation of filter pape
for standardizing speed and retenti
ranges. Retention method, employing
finely divided dispersion, assigns numer
cal test values to filter papers, with equ
precision on very fast, loose texture
grades and on sheets of great densit
Wide range of scale and diversity of
& S filter papers are represented graph
cally on sedimentation cylinder. Metho
of measurement permits production
paper to definite specifications, repro
ducing the identical physical properti
of each grade at all times.

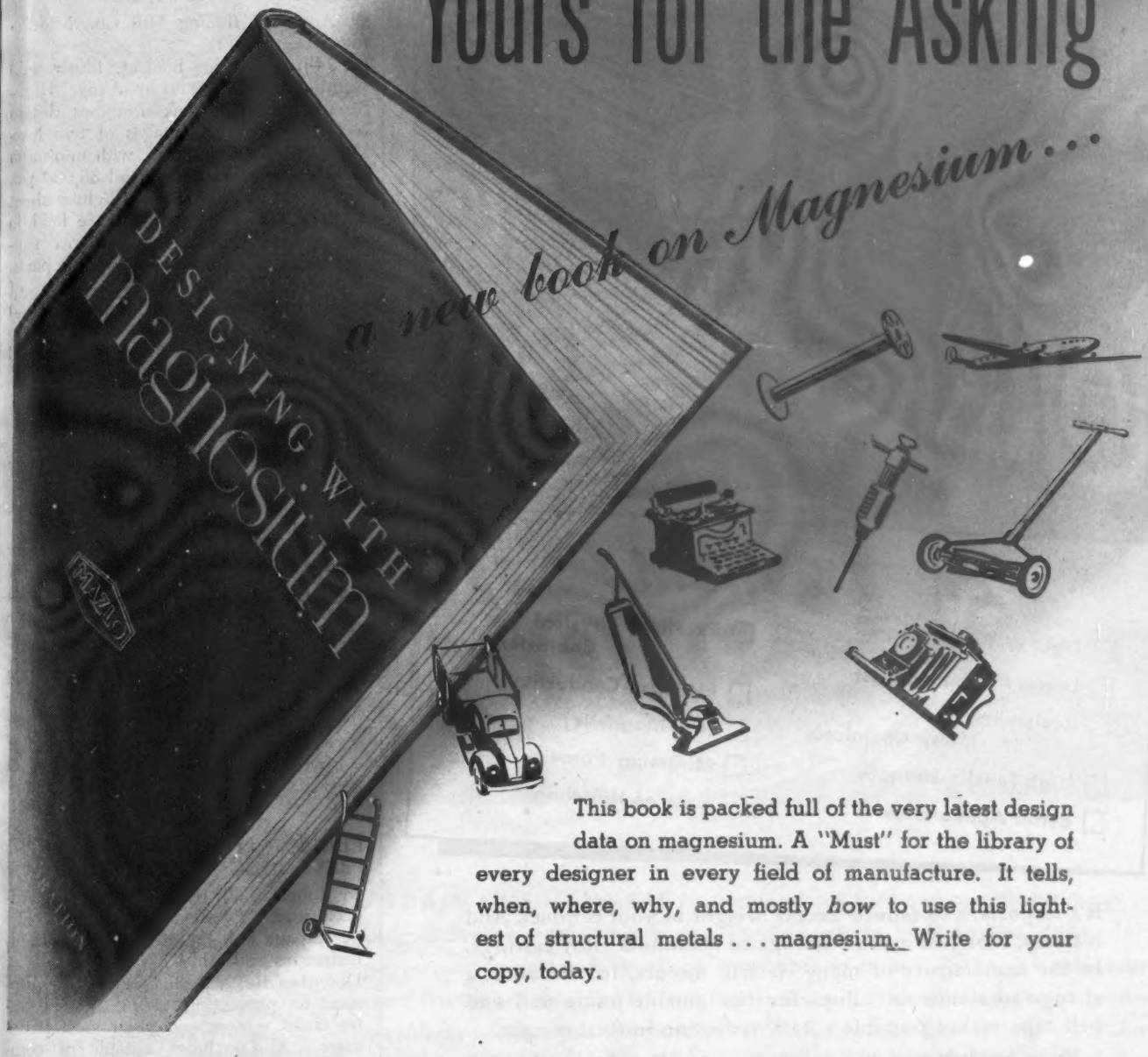
—o—

ELECTRONIC HEATERS

By Allis-Chalmers Mfg. Co., Milwauke
1.
(A 4-page bulletin, No. B6372, illustrated
Discusses application of vacuum tub
electronic heaters for both induction hea
ing of metals and dielectric heating
non-metallic materials, how the two type
of heating work, and advantages of eac
It illustrates typical production setup
of standard 20-kw heater, and lists fe
tures, including a low-loss coupling sy

Yours for the Asking

a new book on Magnesium . . .



This book is packed full of the very latest design data on magnesium. A "Must" for the library of every designer in every field of manufacture. It tells, when, where, why, and mostly *how* to use this lightest of structural metals . . . magnesium. Write for your copy, today.

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

PLEASE SEND ME

Designing with Magnesium ➡

Aluminum Company of America
(Sales Agent for Mazlo Magnesium Products)
1721 Gulf Building, Pittsburgh 19, Pennsylvania

Name _____ Title

Company _____

Address _____

City _____ State _____

LIGHTER WEIGHT is only 1

OF ALUMINUM CASTINGS' 10 BIG ADVANTAGES

CHECK THEM!

- ☐ Light Weight
- ☐ Lower Machining Cost
- ☐ Resistance to Many Chemicals
- ☐ High Tensile Strength
- ☐ Better Appearance
- ☐ Excellent Physical Characteristics
- ☐ Electrical Conductivity
- ☐ Non-Magnetic
- ☐ Minimum Porosity
- ☐ Ease of Handling

It's important to reduce excess weight in your product. And it's easy, too. Just make a change to aluminum alloy castings. In the manufacture of many electric motors, for instance, a change to aluminum alloys for the outside frame and end bell caps makes possible a 25% reduction in total weight.

Your product too may enjoy one—or all—of the other advantages of aluminum listed above. Check off the particular advantages of aluminum you desire for your product. Then submit to Acme along with blueprint or specifications for study and recommendations by Acme experienced engineers. You may find that a change to Acme Aluminum Castings offers you surprising production savings, as well as a lighter weight, superior product. This Acme consulting service places you under no obligation.

ACME ALUMINUM ALLOYS INC.

DAYTON 3, OHIO

Patterns · Tools · Aluminum, Brass, Bronze Castings · Engineering

New York: F. G. Diffen Co., 111 Broadway
Chicago: Metal Parts & Equipment Co., 2400 W. Madison St., St. Louis: Metal Parts & Equipment Co., 3615 Olive St.

tem for adaptability in most applications without use of radio-frequency transformers and a 3-phase rectifier (on sizes 10 kw and larger) to obtain maximum power from heater and to prevent unbalance of the power line.

—o—

HIGH STRENGTH STEELS

By American Rolling Mill Co., Middletown, O.

(A 24-page 2-color booklet, illustrated.)

Entitled "ARMCO Low-Alloy High-Strength Steels," book describes design and fabricating advantages of two low-alloy steels, 50Y and 55Y, with minimum yield strengths of 50,000 and 55,000 psi. It tells how steels permit a lighter sheet steel shell to carry more of the load in transportation equipment such as railway cars, trucks, buses, and aircraft parts. Lighter weight, without sacrifice of strength, assures safe high speeds and bigger pay loads at less cost. Book also includes sections on drawing, forming and welding.

—o—

FLEXIBLE METAL HOSE

By Packless Metal Products Corp., New Rochelle, N. Y.

(A 60-page manual, with photographs, specifications and line drawings.)

Shows correct installation practices for getting maximum serviceability out of hose and how to assemble detachable self-sealing hose couplings and self-flaring fittings for copper and plastic tubing at the job. Also describes complete line of hose construction, flange and coupling types, vibration absorbers, laundry and platen press units, and other specialties such as a flexible fastener for supporting and restricting vibration of rigid tubing and flexible hose.

—o—

ELECTRICAL METHOD OF PREVENTING RUSTING

By Johnston & Jennings Co., 864 Addison road, Cleveland 14.

(A 12-page bulletin, No. R-181, with illustrations and tables.)

Describes Rusta Restor, cathodic equipment for preventing rusting of steel water tanks, piping, and other steel structures. Also includes a table of comparative costs of various methods of protecting steel tanks.

—o—

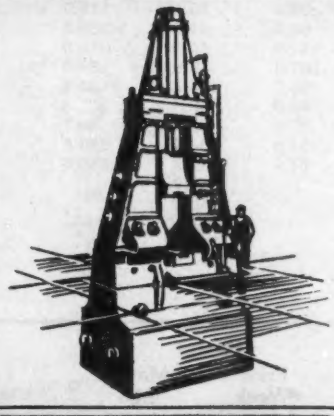
DEOXIDINE CLEANING PROCESSES

By American Chemical Paint Co., Ambler, Pa.

(Technical Service Data Sheet No. 3-1-1-2, March 15, 1945.)

Describes types of Deoxidine for removing rust and for various metal conditioning jobs. Compound may be applied by spray, brush or dip. Other products include: Metal cleaners—acids; acid controls—inhibitors; copper coatings—chemicals; metal stripping—compound; rust preventing and metal treating oil; fluxes; alkalies—cleaning compounds and addition agents; and heat resisting paints.

FORGINGS *for the Machines of Peace*



AGAIN ERIE HAMMERS in hundreds of forge shops throughout the United States and Canada are forging parts vital to the dependable performance and safety of the machines of peace . . . Trucks, passenger cars, transport airplanes, farm implements . . . the great mass of modern machines which ease the burdens of industry and agriculture . . . These are once more coming from the anvils of thousands of Erie Hammers. As the war-torn lands overseas begin to rehabilitate, Erie Hammers will again thunder their resonance in the forge shops of the world.

Ask for your copy of bulletins giving full details on Erie Steam or Air Hammers, Board Drop, Single or Double Frame Forging Hammers and Erie Trimming Presses.

ERIE

ERIE FOUNDRY CO. • ERIE, PA.

ERIE BUILDS *Dependable* HAMMERS

THE BUSINESS TREND

Upswing in Industrial Activity Leveling Off

THE UPSWING in industrial activity during most of November has leveled off, and strikes in the automobile industry are injecting a depressive influence into December activity.

In the week ended Dec. 1, automobile assembly of only 13,140 units was 21 per cent under that of the previous week, and there is little prospect that the largest strike in that industry, the strike against General Motors Corp., will end soon enough for any appreciable increase in auto output in December.

Meanwhile, steel ingot production remains nearly steady, a little above 80 per cent of capacity, but shows little tendency to gain.

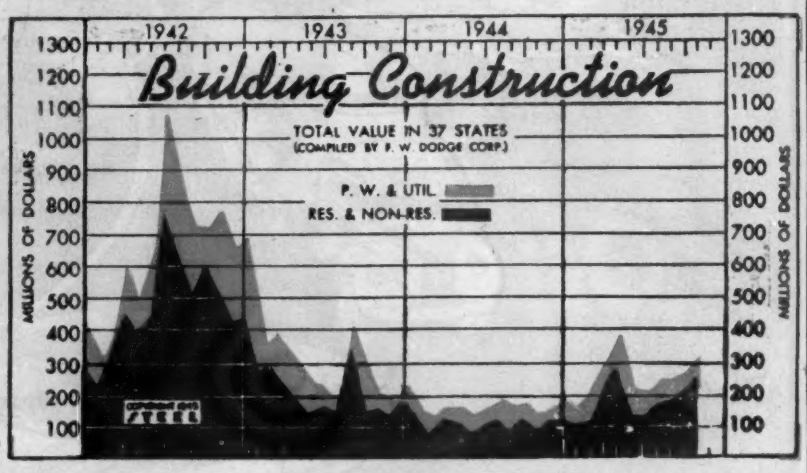
INDUSTRIAL INDEX — Reflecting further curtailment in munitions activity and reduced production as a result of labor disputes in some industries, the Federal Reserve Board's industrial production index declined 4 per cent in October to 164 per cent of the 1935-1939 average, or to about the level of October, 1941.

PRICES—Rising 0.4 per cent in the week ended Nov. 24, the Bureau of Labor Statistics index of commodity prices in primary markets reached its highest level in nearly 25 years. The rise put the index 0.9 per cent above four weeks ago and 2.5 per cent above late November, 1944.

CONSTRUCTION—Substantial gains in construction contracts in October, probably attributable in part to removal in mid-October of all federal restrictions on building, were reported for the 37 states east of the Rocky mountains by F. W. Dodge Corp. Contracts awarded in October totaled $316,571,000, a 13 per cent increase over September and 118 per cent above October, 1944.

CASTINGS—Production of gray iron and malleable iron castings decreased in September to lowest marks for the year. Output of gray iron castings totaled 665,516 tons, a 1.3 per cent decrease from August, and production of malleable iron castings amounted to 52,217 tons, 3 per cent under August. At the end of September, the unfilled order position of gray iron foundries had not exhibited any sharp decline as a result of the end of the war against Japan. Unfilled orders on September 30 amounted to 2,324,620 tons, only 2 per cent under those at the end of August, and only 14 per cent under the wartime peak of 2,713,656 tons, reached at the end of March, 1945.

MACHINE TOOLS—October shipments of machine tools rose 14 per cent above September. Of October shipments of $31,100,000, foreign countries received 19 per cent compared with 24 per cent of September's shipments of $27,300,000.



Construction Valuation In 37 States
(Unit—$1,000,000)

	Total		Public Works-Utilities		Residential and Non-Residential	
	1945	1944	1945	1944	1945	1944
January	140.9	159.2	39.8	50.3	101.2	108.9
February	147.0	137.2	32.0	55.1	115.0	82.1
March	328.9	176.4	90.6	61.3	238.3	115.1
April	395.8	179.3	111.9	72.0	283.9	107.3
May	242.5	144.2	107.9	55.8	134.6	88.4
June	227.3	163.9	95.0	70.7	132.3	93.1
July	257.7	190.5	89.9	80.5	167.8	110.0
August	263.6	169.3	77.5	69.4	186.1	99.9
September	278.3	175.7	54.6	64.1	223.6	111.6
October	316.6	144.8	61.1	52.2	255.5	92.6
November	....	164.9	....	48.0	....	116.9
December	....	188.5	....	66.6	....	121.8
Total	....	1,993.9	....	746.0	....	1,247.7

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	83.5	82.5	73	96.5
Electric Power Distributed (million kilowatt hours)	4,043	3,841	3,899	4,524
Bituminous Coal Production (daily av.—1000 tons)	1,700	1,900	2,022	1,906
Petroleum Production (daily av.—1000 bbls.)	4,448	4,469	4,318	4,713
Construction Volume (ENR—Unit $1,000,000)	$59.6	$46.1	$87.8	$36.0
Automobile and Truck Output (Ward's—number units)	13,140	16,750	27,320	19,180

*Dates on request.

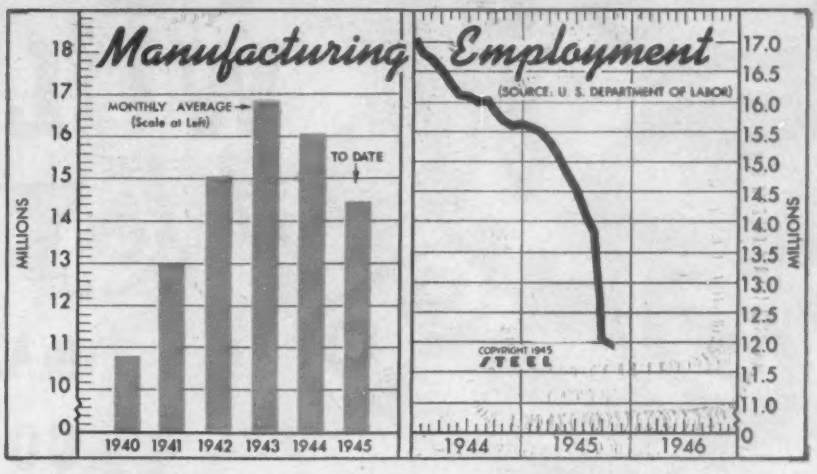
TRADE				
Freight Carloadings (unit—1000 cars)	725†	716	852	808
Business Failures (Dun & Bradstreet, number)	15	7	17	26
Money in Circulation (in millions of dollars)‡	$28,169	$28,198	$28,026	$24,997
Department Store Sales (change from like wk. a yr. ago)‡	+9%	+9%	+12%	+17%

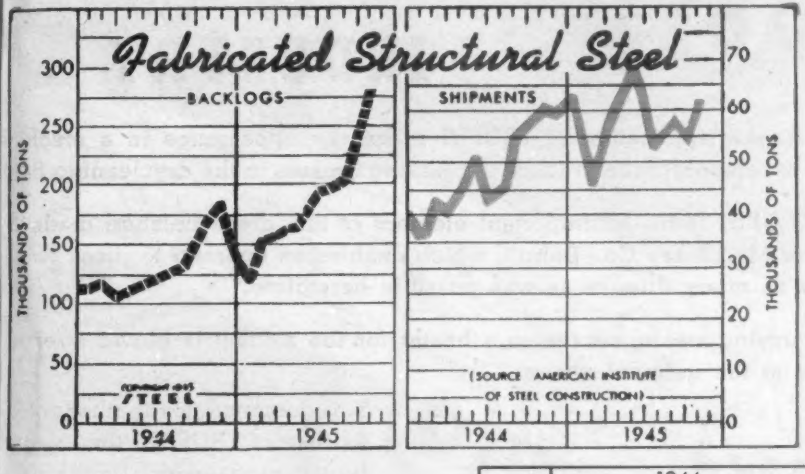
†Preliminary. ‡Federal Reserve Board.

Factory Employment

(000 omitted)

	1945	1944	1943
January	15,555	16,825	16,423
February	15,517	16,735	16,599
March	15,368	16,559	16,747
April	15,102	16,309	16,774
May	14,811	16,122	16,753
June	14,538	16,093	16,908
July	14,136	16,013	17,059
August	13,862	16,023	17,182
September	12,132	15,843	17,136
October	11,960	15,692	17,194
November	.....	15,607	17,238
December	.....	15,632	17,080
Monthly Ave.	.....	16,121	16,924





Fabricated Structural Steel

(1000 tons)

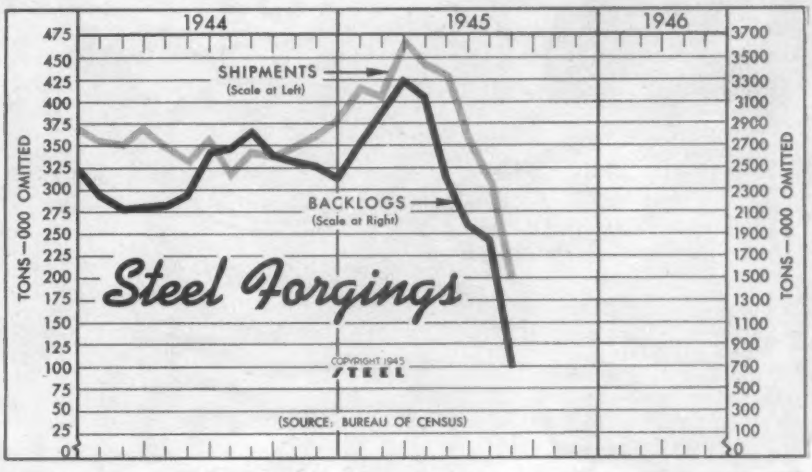
	Shipments			Backlogs		
	1945	1944	1943	1945	1944	1943
Jan.	55.4	35.2	91.9	124.4	113.1	339.1
Feb.	47.9	42.9	90.8	151.6	117.6	321.0
Mar.	58.8	41.4	94.0	153.3	106.3	299.8
April	62.2	44.5	86.6	162.5	111.2	272.5
May	71.5	50.7	78.9	165.7	116.3	220.6
June	68.4	43.0	68.4	195.2	122.7	207.1
July	68.1	45.3	56.8	194.0	125.4	201.8
Aug.	68.7	55.2	50.2	201.1	130.4	195.6
Sept.	60.7	57.5	51.8	248.5	151.1	208.1
Oct.	62.1	61.6	80.1	282.8	174.4	274.0
Nov.	...	59.4	42.7	....	184.2	134.6
Dec.	...	61.3	39.6	....	142.5	113.0

Source: American Institute of Steel Construction. Figures represent members' reports only.

Steel Forgings

(Tons—000 omitted)

	Shipments		Backlog		Consumption of steel	
	1945	1944	1945	1944	1945	1944
Jan.	417	355	2,723	2,256	556	521
Feb.	406	350	3,018	2,132	544	509
Mar.	469	370	3,304	2,142	632	521
Apr.	442	347	3,147	2,166	576	494
May	430	330	2,428	2,252	507	453
June	357	359	1,947	2,637	467	487
July	306	315	1,855	2,670	393	441
Aug.	195	341	696	2,821	257	483
Sept.	...	336	....	2,602	...	463
Oct.	...	348	....	2,564	...	488
Nov.	...	360	....	2,510	...	488
Dec.	...	377	....	2,408	...	506



FINANCE

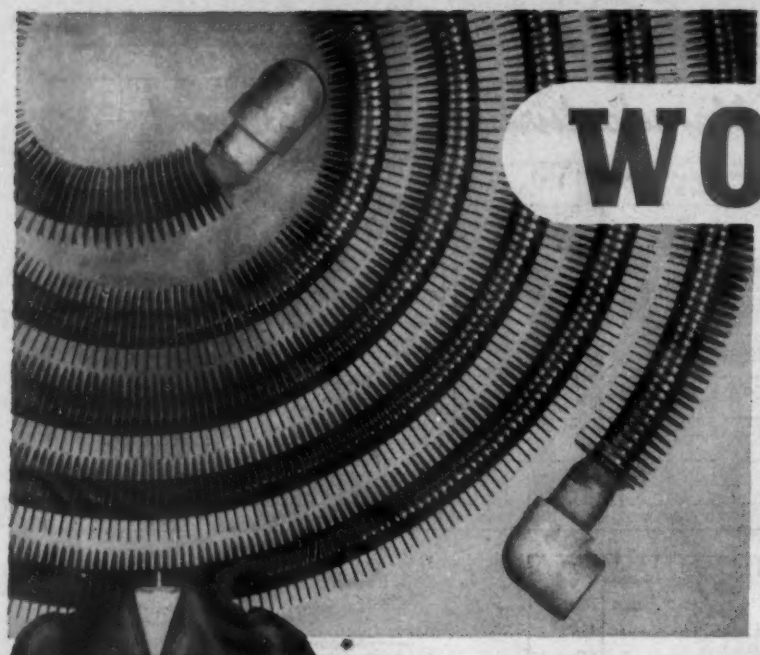
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,871	$12,595	$11,376	$9,908
Federal Gross Debt (billions)	$265.4	$264.6	$262.0	$215.6
Bond Volume, NYSE (millions)	$41.8	$41.3	$36.3	$65.5
Stocks Sales, NYSE (thousands)	9,959	8,205	9,464	5,382
Loans and Investments (billions)†	$62.1	$61.1	$61.0	$54.2
United States Gov't. Obligations Held (millions)†	$45,550	$45,176	$45,458	$39,924

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$56.73
All Commodities†	106.7	106.3	105.7	104.1
Industrial Raw Materials†	120.2	119.1	117.4	114.1
Manufactured Products†	102.3	102.2	101.9	101.2

†Bureau of Labor Statistics Index, 1926 = 100.



WOLVERIN
TRUFIN

MAKES NEW AND VITA
CONTRIBUTION T
INDUSTRY

A new application of TRUFIN makes its appearance in a machine destined to revolutionize the practice of pressing dresses in the drycleaning field.

A coil of TRUFIN forms an important element of this dress finisher, made by the Excelsior Machinery Co., Detroit, which enables an operator to press two or three times as many dresses as was possible heretofore.

The coil (carrying steam) serves as a heater for the air that is blown over the finned tube to the garment above.

This demonstrates another po tial use of TRUFIN—the inte finned tube—which lends itse to fabrication into many forms meet a variety of requirements Consider its possibilities in con nection with YOUR product. I represents an economical mean of gaining increased surface are in compact space.

SPECIFICATION OF THE COI

Coil, 19" diameter • Made o high finned copper tubing • 7 fins per inch • 5/8" root dia. o tube, with .049" wall • Approxi mately 15' in length.

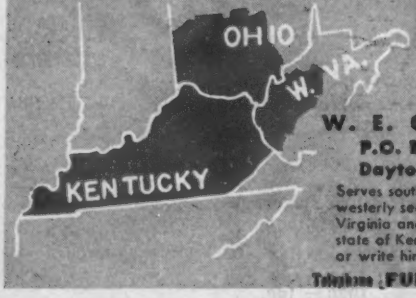
WOLVERINE

TUBE DIVISION

CALUMET & HECLA CONSOLIDATED COPPER COMPANY

1411 CENTRAL AVENUE • DETROIT 9, MICHIGAN

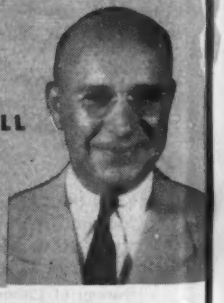
WHO'S WHO AMONG WOLVERINE REPRESENTATIVES



W. E. CAMPBELL
P.O. Box 1041
Dayton 1, Ohio

Serves southwestern Ohio westerly section of West Virginia and the entire state of Kentucky. Call or write him.

Telephone FULTON 6310



In Canada—Unifin Tube Co., London, Ont. ★ Southwest—Republic Supply Co., Houston, Texas

Not just because we're the oldest and largest maker of solid tool steel knives—not because our knives have set such remarkable performance records in other plants—BUT because we *know* that our knives, in your mill, under your own operating conditions will give you more and cleaner cuts per dollar of cost . . . we recommend Heppenstall knives as a basic and proved advantage in meeting tougher marketing competition. Write for a quotation. Heppenstall Co., Pittsburgh 1, Pa.

Heppenstall

the most dependable name in forgings

COME TO CLEVELAND FOR THE METAL SHOW!

FEB. 4 THRU 8

CLEVELAND PUBLIC HALL

SEE A REALLY GREAT INDUSTRIAL EVENT

Other Metal Shows have been great in their contribution to industrial progress . . . but . . . for an event that will be unsurpassed in the presentation of new ideas, processes and production equipment . . . don't miss the 27th National Metal Congress and Exposition . . . February 4 through 8 . . . Cleveland Public Auditorium.

Here you will see revealed for the first time many processes, techniques and products that have not been available for widespread application until now. Many will fit into your production scheme — will help you increase production and improve your products. No event or combination of events will ever contribute so much in the way of profitable production ideas.

More than 350 manufacturers have reserved some eight acres of display space. Technical program will be concentrated into sessions on Monday and Tuesday with a special lecture on Wednesday and educational lectures on Thursday and Friday.

Cleveland hotels will be crowded. But housing accommodations are available. If you do not have a room reservation, fill in this coupon today and mail to the Cleveland Convention and Visitors Bureau — or write on your own letterhead.

NATIONAL METAL CONGRESS AND EXPOSITION

FEBRUARY 4TH THRU 8TH

CLEVELAND'S PUBLIC AUDITORIUM

Mr. Edward Brennan, Executive Vice President
Cleveland Convention and Visitors' Bureau, Inc.
1604 Terminal Tower, Cleveland 13, Ohio

Dear Mr. Brennan:

I plan to attend the 27th National Metal Congress and Exposition and will require type of room checked below. I will arrive February..... and leave February.....

☐ Single room, approximate rate.....

☐ Double room, approximate rate.....

☐ I prefer accommodations in a hotel but will accept room in private home.

NAME _____

FIRM _____

ADDRESS _____

CITY _____ ZONE NO. _____ STATE _____

Steel Users Shift to Less Heavily Loaded Products

Change specifications to obtain earlier delivery . . . Auto strike fails to release steel for other uses . . . Pig iron, scrap shortages hamper

SUBSTITUTION of steel and iron grades in the effort to obtain better deliveries is being practiced by many steel consumers, shifting specifications to material under less delivery pressure.

This is a new feature of the market, resulting from greatly delayed deliveries on many grades of steel, offering some degree of relief and aiding manufacturers in production of their regular lines. One instance is shift by some light forgers from hot-rolled carbon bars to cold-drawn bars, while others have turned to alloy bars instead of plain carbon. Both the latter grades offer earlier delivery and practice has been changed to utilize the substituted grades as a means of continuing production and giving better delivery on the finished product. Even in pig iron substitutions are being made, interchanging various foundry grades and even using malleable instead of foundry iron in some cases where availability so dictates.

Pressure for steel shipment to general manufacturers shows no easing and producers are filled for months ahead, many adhering to some sort of quota system to spread production to regular customers in proportion to normal consumption.

Steel users who expected that a result of the automotive strike would be to release steel for other uses during the period of idleness have been disappointed and relatively little tonnage has been suspended. On the contrary, shipments are going forward steadily, material being stored for later use when car production is resumed. Some is being shipped to public warehouses for storage in cases where it can not be taken into automobile plants. Until storage facilities are exhausted there appears little likelihood of heavy suspensions.

Raw material supply still hampers steel production, pig iron and scrap both being tight. With the foundry labor situation somewhat better, more pig iron is required but producers are unable to increase output materially and are forced to make the best distribution possible of their output. So evenly balanced have been production and consumption that no inventories have been accumulated at furnaces and most melters have not been able to build stocks to the 30-day limit allowed. This paints a dull picture for winter.

Scrap also continues short and steelmakers are paying full springboards and high freight charges to obtain material from a distance. Government material from terminated contracts and that not needed by the services is appearing and is taken readily, sometimes at prices above the price for unprepared material, when disposed of to dealers who take it to yards for preparation.

Steelmaking rate held steady last week, the estimated national rate remaining at 83½ per cent of capacity, after five weeks of rising production following the low point during the soft coal strike. Pittsburgh rate rose ½-point to 79 per cent, Wheeling 5 points to 95, Cleveland 1 point to 86, eastern Pennsylvania 2 points to 80 and New England 1 point to 83. Chicago lost 3 points to 90½ per cent and Detroit 2 points to 89. Rates were unchanged as follows: Youngstown 80, Buffalo 88½, Cincinnati 67, St. Louis 68 and Birmingham 95.

With lake navigation practically closed Dec. 1, except for two or three cargoes last week, Lake Superior iron ore shipments for the season totaled 75,643,715 gross tons, 5,526,823 tons, 6.81 per cent, less than was moved in the season of 1944. Canadian mines contributed 956,659 tons, 604,626 tons shipped from Michipicoten and Port Arthur, and 352,033 tons from docks at Superior, Wis., before the Port Arthur docks were completed. Stocks at furnaces and docks are ample for winter.

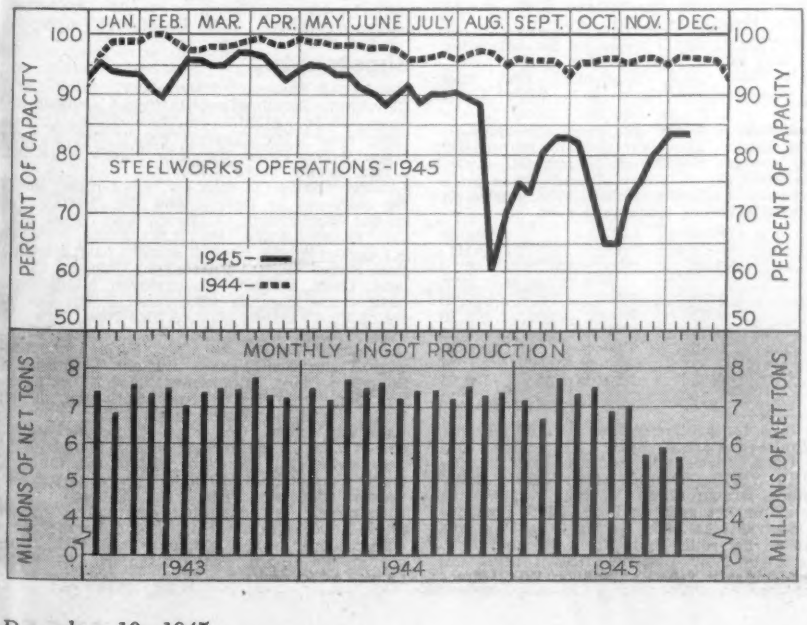
Average composite prices of steel and iron products are unchanged, governed by ceiling prices. Finished steel composite is $58.27, semifinished steel $37.80, steelmaking pig iron $24.80 and steelmaking scrap $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Dec. 8	Change	Same Week 1944	Same Week 1943
Pittsburgh	79	+0.5	91	99
Chicago	90.5	—3	100	101
Eastern Pa.	80	+2	95.5	93
Youngstown	80	None	89	89
Wheeling	95	+5	97	101.5
Cleveland	86	+1	94	87.5
Buffalo	88.5	None	79	86
Birmingham	95	None	95	95
New England	83	+1	88	93
Cincinnati	67	None	87	87
St. Louis	68	None	75	89.5
Detroit	89	—2	87	86
Estimated national rate	83.5	None	96.5	98

*Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	Dec. 8	Dec. 1	Nov. 24	One Month Ago Nov., 1945	Three Months Ago Sept., 1945	One Year Ago Dec., 1944	Five Years Ago Dec., 1940
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$56.73	$56.73
Semifinished Steel	37.80	37.80	37.80	37.80	37.80	36.00	36.00
Steelmaking Pig Iron	24.80	24.80	24.80	24.80	24.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	18.95	21.40

Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; other, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material

	Dec. 8, 1945	Nov., 1945	Sept., 1945	Dec., 1944
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.57	2.47
Steel bars, Chicago	2.25	2.25	2.25	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.25	2.10
Plates, Philadelphia	2.30	2.30	2.30	2.15
Plates, Chicago	2.25	2.25	2.25	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.70	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.70	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.75	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.90	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$36.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	36.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	36.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron

	Dec. 8, 1945	Nov., 1945	Sept., 1945	Dec., 1944
Bessemer, del. Pittsburgh	$26.94	$26.94	$26.19	$25.19
Basic, Valley	25.25	25.25	24.50	23.50
Basic, eastern del. Philadelphia	27.09	27.09	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	26.44	26.44	25.69	24.69
No. 2 foundry, Chicago	25.75	25.75	25.00	24.00
Southern No. 2, Birmingham	22.13	22.13	21.38	20.38
Southern No. 2 del. Cincinnati	26.05	26.05	25.30	24.30
No. 2 fdry., del. Philadelphia	27.59	27.59	26.84	25.84
Malleable, Valley	25.75	25.75	25.00	24.00
Malleable, Chicago	25.75	25.75	25.00	24.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.94	25.94	25.19	24.19
Ferromanganese, del. Pittsburgh	140.00	140.00	140.33	140.33

Scrap

Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$19.75
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.45	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	16.70
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$7.50	$7.50	$7.50	$7.00
Connellsville, foundry ovens	8.25	8.25	8.25	7.75
Chicago, by-product fdry., del.	13.35	13.75	13.75	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O. may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64. Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42, Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18-in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—⅜ in. inclusive, per 100 lbs., $2.15 Do., over ⅜—41-in., incl., $2.30; Galveston, base, 2.25c and 2.40c respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.05 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3: Pittsburgh, Youngstown, Chicago Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c, (Calumet Steel Division. Borg-Warner Corp., and Joslyn Mfg. & Supply Co., may quote 2.55c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis. Phoenix Iron Co., 2.50c.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit del., 2.80c. (Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

* Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del. 3.78c; Pacific ports 4.25c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.36c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron, 3.90c; pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; 20-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	....
65	7.25c	8.00c	.....
58	7.75c	8.50c	.....
52	8.55c	9.30c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.25c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.25 lb. tin, $4.35; 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65; Granite City, $4.45, $4.60, $4.75, respectively

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed, 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c; Gulf ports, 3.85c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c; Gulf ports. 2.45c.

(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.45c, Bethlehem, Pa., on the general range and 2.55c on beams and channels from 4 to 10 inches.)

Steel Piling: Pittsburgh, Chicago, Buffalo, 2.40c; Pacific ports, 2.95c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham to manufacturers in carloads.

Bright basic, bessemer wire *2.75c
Spring wire ..... *†3.35c

Wire Products to the Trade:

Standard and cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, $2.90; Pac. ports, $3.40; galvanized, $2.55 and $3.05, resp.

Annealed Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.20

Galvanized Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.55

Woven fence, 15½ gage and heavier, per base column 67

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 72; twisted barbless wire, column 72.

*Add 0.10c for Worcester, 0.05c for Duluth; add 0.5c for bright, annealed, galvanized and 1.7c for other finishes for Pacific ports.

†Same bases as for bright basic except Birmingham.

††Add 10 cents for Worcester; 50 cents for annealed, bright basic and 70 cents for all other finishes for Pacific ports.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	⅛	24	3½
¼ & ⅜	59	40½	¼	30	10
½	63½	51	⅜	34	16
¾	66½	55	1-1¼	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½-3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D Sizes	B.W.G	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $46 net ton, base, Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Base, per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	‡‡18.00	19.00	.....	.....

*With 2-3% moly. ‡With titanium. †With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago Birmingham

Structural 3.75c

⅞- inch and under ..... 65-5 off
Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ..... $2.75-3.00 off

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅞ x 6-in. and shorter	63½ off
Do., 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	58 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	50 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
¼-inch and less	62	64
⅜-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	66 off
No. 10, smaller	70 off

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extra mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	13.05
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.60
St. Louis, delivered	†13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.20

*Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945. †14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$28.90

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.244[21]	4.715	6.012[29]	6.01[3]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.206[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.206[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[13]	4.872[28]	4.172[21]	4.772	5.816[29]	5.80[3]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[28]	4.152[21]	.....	.....	.....
Washington	3.941[2]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.141[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.265[21]	.....	.....	.....
Alsbom, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.85[21]	4.669	5.60[29]	5.75[3]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.75[21]	4.35	5.60[29]	5.75[3]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.80[1]	3.80[1]	4.75[13]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.85[21]	4.45[21]	5.60[29]	5.65[3]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[2]	3.661[1]	3.609[1]	5.281[1]	3.450[2]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.900[21]	4.659	5.93[29]	5.98[3]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.885[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.543[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.785[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.891[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[13]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[15]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.85[21]	4.65	5.75[29]	5.85[3]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.987[21]	4.787	5.987[29]	6.087[3]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	4.08[21]	4.78	6.08[29]	6.18[3]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.461[21]	5.102	6.09[29]	6.19[3]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[13]	5.172[15]	4.347[24]	4.131[21]	4.931	6.131[29]	6.231[3]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.763[3]	4.313[3]	4.313[3]	5.313[26]	4.10[10]	3.75[21]	.....	.....	.....
Los Angeles	4.40[1]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[13]	7.20[6]	5.683[22]	5.613	5.85[29]	5.95[3]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[13]	7.30[15]	5.483[21]	7.383	8.304[29]	8.404[3]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[13]	6.60[15]	5.683[13]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00[3]
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[13]	7.05[15]	5.883[21]	.....	.....	8.00[3]

*Basing point cities with quotations representing mill prices, plus warehouse spread.
NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [24]—1000 to 39,999 pounds; [26]—400 to 1499 pounds; [28]—1000 to 1999 pounds; [29]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]— 300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	18.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1 less $7 freight allowance	52.50

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo. 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 245 effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, or dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnace

Designation	Chemical Composition Limits, Per Cent — C	Mn.	Si.	Cr.	Ni.	Mo.	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 20, effective June 10, 1941, amended Feb. 14, and Oct. 22, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.75	$26.25	$27.75	$27.25
Newark, N. J., del.	28.28	27.78	29.28	28.78
Brooklyn, N. Y., del.	29.25	.....	.....	29.75
Birdsboro, Pa., base	26.75	26.25	27.75	27.25
Birmingham, base	22.13	20.75	26.75	.....
Baltimore, del.	27.36	.....	.....	.....
Boston, del.	26.89	.....	.....	.....
Chicago, del.	25.97	.....	.....	.....
Cincinnati, del.	25.81	24.48	.....	.....
Cleveland, del.	25.87	24.99	.....	.....
Newark, N. J.	27.90	.....	.....	.....
Philadelphia, del.	27.21	26.71	.....	.....
St. Louis, del.	25.87	24.99	.....	.....
Buffalo, base	25.75	24.75	26.75	26.25
Boston, del.	27.25	26.75	28.25	27.75
Rochester, del.	27.28	.....	28.28	27.78
Syracuse, del.	27.83	.....	28.83	28.33
Chicago, base	25.75	25.25	26.25	25.75
Milwaukee, del.	26.85	26.35	27.35	26.85
Muskegon, Mich., del.	28.94	.....	.....	28.94
Cleveland, base	25.75	25.25	26.25	25.75
Akron, Canton, del.	27.14	26.64	27.64	27.14
Detroit, base	25.75	25.25	26.25	25.75
Saginaw, Mich., del.	28.06	27.56	28.56	28.06
Duluth, base	26.25	25.75	26.75	26.25
St. Paul, del.	28.38	27.88	28.88	28.38
Erie, Pa., base	25.75	25.25	26.75	26.25
Everett, Mass., base	26.75	26.25	27.75	27.25
Boston, del.	27.25	26.75	28.25	27.75
Granite City, Ill., base	25.75	25.25	26.25	25.75
St. Louis, del.	26.25	25.75	.....	26.25
Hamilton, O., base	25.75	25.25	.....	25.75
Cincinnati, del.	26.19	26.36	.....	26.86
Neville Island, Pa., base	25.75	25.25	26.25	25.75
§Pittsburgh, del. No. & So. sides	26.44	25.94	26.94	26.44
Provo, Utah, base	23.75	23.25	.....	.....
Sharpsville, Pa., base	25.75	25.25	26.25	25.75
Sparrows Point, base	26.75	26.25	.....	.....
Baltimore, del.	27.74	.....	.....	.....
Steelton, Pa., base	.....	26.25	.....	27.25
Swedeland, Pa., base	26.75	26.25	27.75	27.25
Philadelphia, del.	27.59	27.09	.....	28.09
Toledo, O., base	25.75	25.25	26.25	25.75
Youngstown, O., base	25.75	25.25	26.25	25.75
Mansfield, O., del.	27.69	27.19	28.19	27.69

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. § For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenbridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)		$31.25
6.51-7.00	$32.25	9.01- 9.50. 37.25
7.01-7.50	33.25	9.51-10.00. 38.25
7.51-8.00	34.25	10.01-10.50. 39.25
8.01-8.50	35.25	10.51-11.00. 40.25
8.51-9.00	36.25	11.01-11.50. 41.25

F.o.b. Jackson county, O., per gross ton. Buffalo base $1.25 higher, whichever is most favorable to buyer. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. $33.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $25.25
Valley base 25.25

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $31.25 base; $32.49, del. Philadelphia. Intermediate phos., Central Furnace, Cleveland, $28.25.

Switching Charges: Basing Point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $68.50

First Quality

Pa., Ill., Md., Mo., Ky.	54.40
Alabama, Georgia	54.40
New Jersey	50.35
Ohio	47.70

Second Quality

Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	38.15

Malleable Bung Brick

All bases 63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	32.90
Wire Cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded Magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.00 war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135 f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn.; where Tennessee Products Co. is producer; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is producer; $140 f.o.b. cars, Pittsburgh, where Carnegie-Illinois Steel Corp. is producer; add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l. 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l. max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom: 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%. car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max, sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract ton lots, $1.89, less $2.01, eastern; freight allowed; $1.903 and $2.623, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide, approx. 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c, and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all f.o.b. Bridgeville, Pa., usual freight allowance.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c; 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western. 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96% min. manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 30c, 2000 lb. to c.l., 32c, central, 30.25c, and 33c; western 30.55c and 35.05c.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: Spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6.8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ¼ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.31
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Mach. Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	22.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Heavy Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Heavy Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn.	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.50
Shoveling Turnings	12.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	9.50-10.00
Shoveling Turnings	11.50-12.00
Cast Iron Borings	11.00-11.50
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2, Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	7.00
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut, Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.00
Tin Can Bundles	14.50
No. 2 Steel Wheels	15.50
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.50
Uncut Frogs, Switches	15.50
Scrap Rails	15.50
Locomotive Tires	15.50

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¼c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1¼c; 0-499 2c. Castings, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Price for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Open market, spot, New York, $93-$98 per 76-lb. flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" bbls. 34.00c f.o.b. Niagara Falls.

straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 70.625c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.48c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Durenze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.96c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lbs. or more; del; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%; Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.785
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz Metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	8.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Price f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross; die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

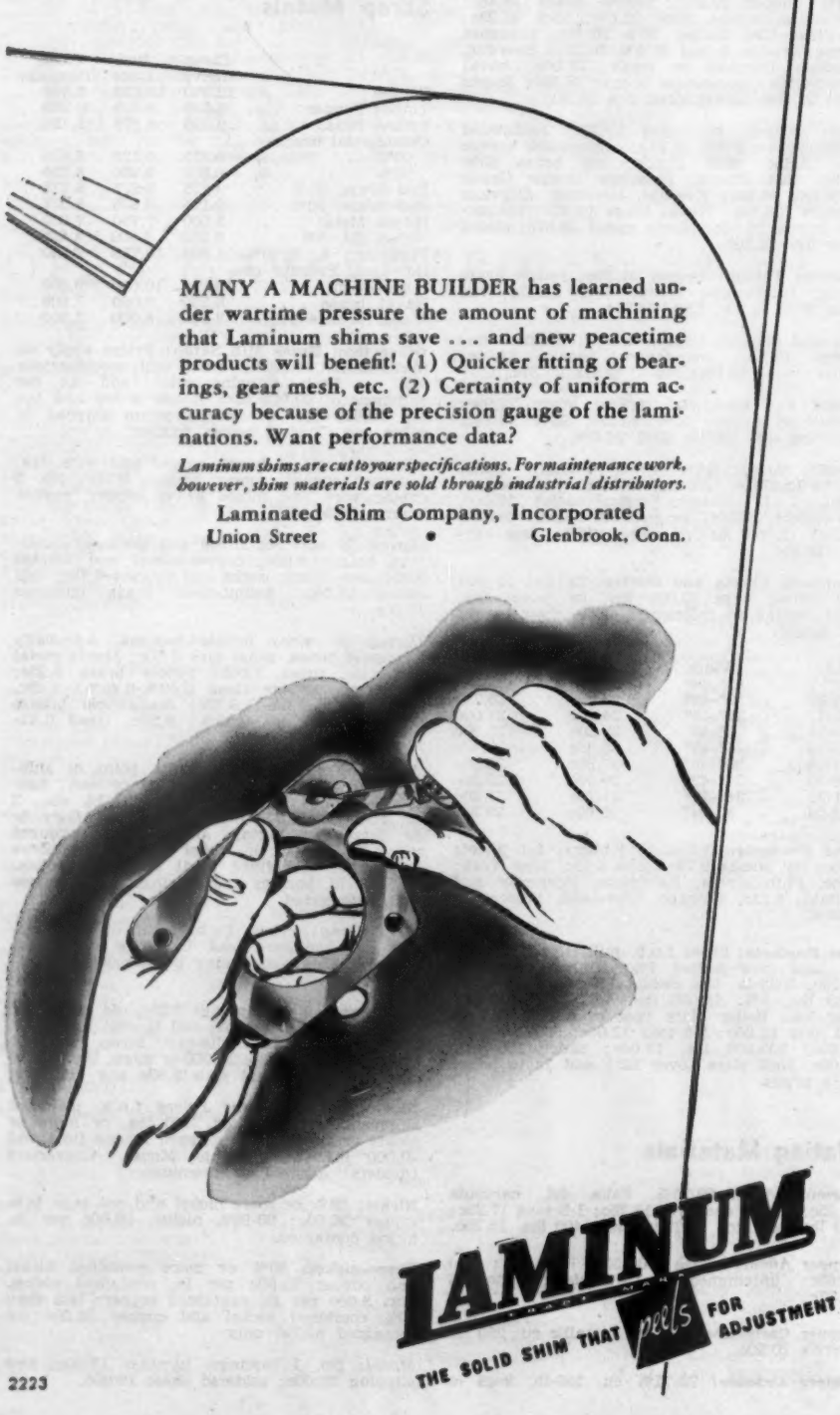
Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

A LESSON FOR NEW PRODUCTS

MANY A MACHINE BUILDER has learned under wartime pressure the amount of machining that Laminum shims save . . . and new peacetime products will benefit! (1) Quicker fitting of bearings, gear mesh, etc. (2) Certainty of uniform accuracy because of the precision gauge of the laminations. Want performance data?

Laminum shims are cut to your specifications. For maintenance work, however, shim materials are sold through industrial distributors.

Laminated Shim Company, Incorporated
Union Street • Glenbrook, Conn.



LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

2223

Sheets, Strip . . .

Sheet & Strip Prices, Page 194

Tight conditions prevail in sheets and strip, with no signs of easing. Some sellers limit specifications to first quarter, while others have orders far beyond that, in some instances being covered for all next year. Somewhat less pressure is felt from regular customers of mills, apparently more reconciled to the quota system. Shipments to strike-bound automobile builders have not been interrupted to an important degree, as storage is preferred to shortage when car production is resumed.

New York—Sheet consumers are still shopping actively for tonnage, although producers report there is less pressure from their own regular customers, due to the fact that the latter are becoming somewhat reconciled to quotas and other restrictions.

In general most sheet sellers are operating on a quota basis and are accepting nothing for rolling beyond first quarter, which means that these interests are out of the market to all practical purposes. Other sellers have booked orders far in advance of first quarter, but even some of these are now reaching the point where they take little additional business. In a few instances these sellers are booked up for all of 1946; still others are booked well into third or early fourth quarter.

These schedules involve hot, cold-rolled and galvanized sheets principally. In electrical sheets, however, the situation is almost as extended, with producers booking tonnage for well into second half in certain cases; others adhere strictly to a quota system which permits them to accept nothing beyond first quarter.

Philadelphia—Extended sheet deliveries apparently are not discouraging a number of buyers. Some producers are booked for all 1946 and claim they could enter much tonnage for shipment beyond that if they were disposed to accept it. Some sellers accept orders for last half next year, but only on a limited basis. Most, however, refuse to book orders for delivery beyond first quarter.

St. Louis — Sheet and strip production continues the moderate increase it has maintained since August, due to a better and higher quality supply of labor. A large quantity of sheets stored because of lack of finishers is beginning to move out. Servicemen are returning in some numbers and workers are showing greater permanence. Supply is still about 10 per cent short, however. The largest sheet mill in this district has been unable to start a seventh open-hearth furnace because of the labor situation. Operation is predicted by Jan. 1 if there is no steel strike. Sheet demand is heavy although orders are slackening, due to extended delivery. One manufacturer is scheduled to open a new cold mill next July and is discouraging orders beyond fourth quarter because of difficulty of arranging future schedules.

Cincinnati—Sheet mill shipments to strike-bound automobile interests continue, although ostensibly the tonnage is being diverted to storage facilities. So far the strike has not caused cutbacks in requisitions. Mills therefore are making up rolling schedules for January, and in part for the whole first quarter, as if there were no obstacles to fabrication. Demand is so pressing that any gaps in schedules may be more than filled. The

pressure for more liberal quota allotments is undiminished. New buying is likewise heavy and in anticipation of needs far into next year.

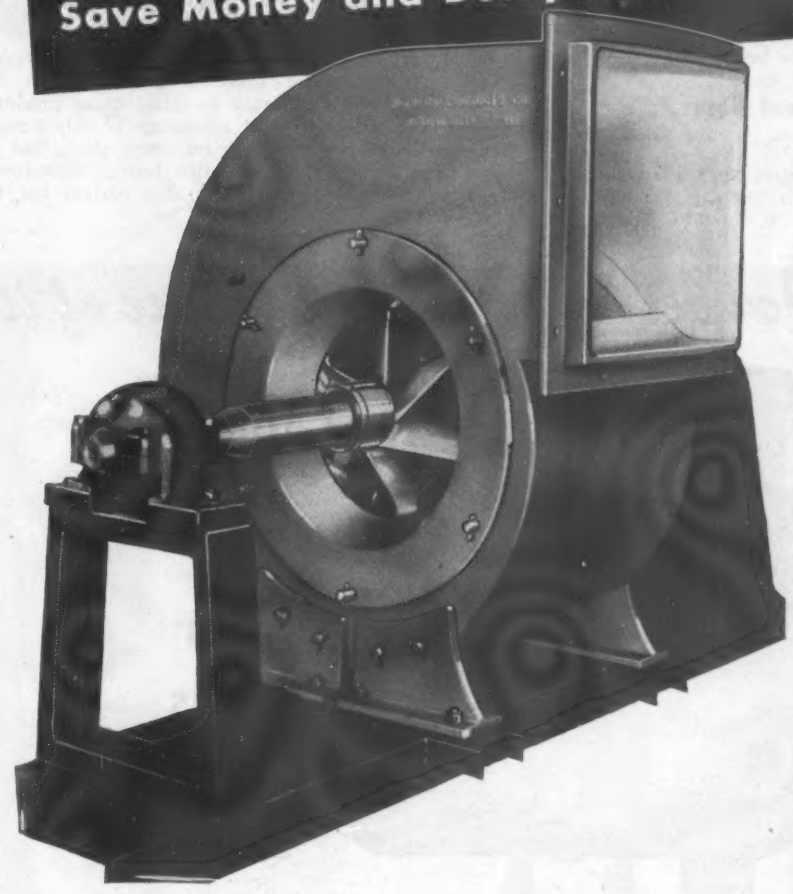
Chicago—The strike at plants of General Motors Corp. is without effect on sheets and strip. Orders for production and shipment stand and deliveries are being made without interruption. In most cases, however, warehouses rather than auto plants proper, are points of consignment. Steel bed makers, who ordinarily use rerolled rail strip, find this no longer available and seek new billet strip to accommodate their requirements.

Boston—Extended and lengthening deliveries on flat-rolled products, with most producers allocating tonnage in some form, have not dented inquiry for steel. Mill backlogs on narrow cold strip still mount, with inquiry and orders in excess of shipments. Those accepting firm orders generally are in third quarter. Checks on persistent pressure for tonnage in volume substantially heavier than ever before indicate fabricators in many cases are not overestimating, based on firm orders they hold for finished products, with increased capacity. Frequently they have not reached the production level they planned. To that extent there is a pinch in steel supply, although manpower sometimes is a contributing factor. Casual comparison with normal requirements would indicate consumers are overestimating, and some unquestionably are, but the number probably is less than assumed earlier. In addition to reconverting to regular products many are adding new lines. Stamping shops are examples. Most have gone back to normal products in heavier volume and many are branching out with finished goods, supplementing their former lines.

Cleveland — Additional sheet mills have withdrawn from the market due to overloaded schedules and the heavy accumulation of orders. The volume of unscheduled business is sufficient to cover all of 1946 operation in many instances. Producers are scanning new orders carefully to prevent duplication and to restrict purchases to quotas established on base-period experience. Producers have noted increased pressure during the past week as consumers attempt to cover needs in anticipation of a steel strike. Practically no suspensions have been requested by General Motors or its suppliers and the automobile industry as a whole is absorbing 60 to 65 per cent of the average sheet and strip tonnage taken in 1940-41. When the industry attains its peak production goal, it will require 150 to 200 per cent of the 1940-41 tonnage, according to some interests. A hindrance to increasing production is delay in removal of government-owned facilities from some steel plants. One nonintegrated steel company may be forced to close its sheet mills soon, due to inability to buy semifinished. Alloy sheet and strip are somewhat easier than carbon grades, with the exception of stainless and automotive steels.

Pittsburgh — Mill bookings of flat rolled steel tonnage continues heavy despite careful screening and overall requirements are far in excess of current production. However, mill order backlogs are believed to be diluted considerably, by duplication. Selective selling, based on location of purchaser in regard to freight absorption and also as to type

CAN THIS TRULY HIGH TEMPERATURE FAN Save Money and Delays for You?



Made of heat-resistant alloys, MICHIANA Fans withstand temperatures as high as 1800° Fahr. This insures low-cost long-time service with minimum delays and replacement troubles.

Distortion and unbalanced conditions are eliminated because of the MICHIANA design with vital operating parts so assembled to allow for free and independent expansion and contraction.

These fans are now available—let us know your requirements . . . MICHIANA PRODUCTS CORPORATION, Michigan City, Indiana.

MICHIANA HIGH TEMPERATURE FANS

Write for new Bulletin 645.

of product in respect to operating costs, is becoming a more definite policy. Most sellers state that the loss in sheet and steel output resulting from the coal strike cannot be made up and therefore their customers have been forced to take a proportionate cut in scheduled shipments. Little tonnage has been held up as a result of the General Motors Corp. strike, for both assembly plants and partsmakers are anxious to build up inventories where possible. To this end storage facilities have been arranged.

Steel Bars . . .

Bar Prices, Page 194

Steel bar buying continues to load mills with tonnage, though the quota system of some producers holds allotments to limits dictated by previous purchases. Some consumers of hot-rolled carbon bars are substituting cold finished bars and even alloy bars, in an effort to obtain earlier delivery. Hot-rolled carbon bar deliveries are well into second quarter for most mills, with smaller sizes even more extended. Shipments to automotive manufacturers have been interrupted little by the strike.

New York — Some light forgers, in an effort to obtain better delivery position, are substituting cold-drawn bars for hot bars. In some cases producers are offering an advantage of only a month to two months on some sizes, but declare that even this proves attractive.

In general little hot carbon bar tonnage is to be had before well into second quarter. On smaller rounds and flats, various producers are booked solidly into third quarter, with one leading interest on the very small sizes, around ¼-inch, now quoting as late as November.

Cold-drawn bar schedules are advancing. This is due in part in some cases to restriction in allotments of hot carbon bars provided by mills, and to an improving demand, due in some measure, although not too importantly as yet, to the demand for cold-drawn in an effort to substitute for hot carbon.

Some producers also report improvement in hot alloy bar demand, by way of a substitution for hot carbon bars, this also being due to a desire on the part of some consumers to obtain better shipment. Deliveries on hot alloy bars now fall generally into February, although some tonnage can still be picked up in January.

Philadelphia — Bar mill schedules are being constantly extended. Some leading producers have no hot carbon tonnage to offer before June and July and in smaller sizes, ranging about ¼ to ⅞ inches, nothing before fourth quarter. Recently there has been an appreciable extension in schedules on large rounds as well. One producer, who less than a fortnight ago offered February shipment, now quotes June. Cold-drawn carbon bar shipments are being offered generally for March, this being an extension, and while some alloy tonnage is still available in January most sellers offer February.

Pittsburgh — Relatively small tonnage has been held up by the General Motors Corp. strike so far, but should the strike continue for 30 days or more hold-up orders may reach sizable tonnages. Hot-rolled and alloy bar producers, as well as cold finishers, report that customers affected by the strike are currently accepting practically all tonnages scheduled, in an effort to build up inventories. Mill openings in rolling schedules for larger sizes are available for late February and March delivery; in smaller sizes backlogs are extended as far as fourth quarter.

Producers state that the simplified practice recommendations for hot-rolled bars and small shapes, proposed by the technical committee on carbon steel bars of the American Iron and Steel Institute, have received general approval and are expected to be officially approved by the Bureau of Standards in Washington no latter than March 1. Except for some minor modifications, the steel industry purposes to continue simplified practice recommendations as incorporated in the now revoked WPB Order L-211 under Schedule 15 and 4. Since this order was revoked by WPB steel producers generally followed the practice of refusing to accept orders for odd sizes because of economies resulting from fewer roll changes.

St. Louis—Demand for bars continues as manufacturers of hard goods press for raw materials. Export demand also is increasing but virtually no foreign orders are being accepted. No delivery promises are being made and schedules are filled through second quarter and beyond. Production remains about 20 per cent under normal, with good prospect that it will increase after Jan. 1, when furnace repairs are completed. The

For better steel . . and more of it
this recorder of facts helps control STEEL QUALITY
YOU find Hays Series "OT" Pressure Recorders on many new and modernized open hearth installations—and for just one purpose: to make a permanent record of furnace performance. Guesswork is eliminated, man power saved, and rejects cut to the minimum.
On the 10-inch 24-hour charts you can have a record of two draft values, two pressure values, two differential values or any combination of two of those three values.
Here's a simple practical means to more effective control of steel quality. Better get the facts about it—send for Bulletin 43-586.
The HAYS CORPORATION
COMBUSTION INSTRUMENTS AND CONTROL
MICHIGAN CITY, INDIANA, U.S.A.

labor supply is improving slightly.

Boston—Hot carbon bar deliveries on smaller sizes range into third quarter and to ease mill schedules and meet wanted shipment producers are successfully revising some consumer specifications to low alloys. This accounts to some extent for the moderate improvement in alloy buying. Aligned with this have been offers of alloy electric furnace grades at open-hearth prices, waiving differentials. Specification changes have also been made to cold-drawn bars. Cold-drawn deliveries are in March and alloys in February. New buying is irregular but pressure for delivery is strong and heavier rounds are being further extended. Of 245 tons sold as surplus St. Pierre Chain Corp., Worcester, Mass., took 195 tons.

Cleveland — Simplified practice recommendation for hot-rolled carbon steel bars and bar-size shapes as proposed by the National Bureau of Standards, Washington, follows closely the wartime practice under War Production Board's order L-211. Bar mills continued to follow that practice after order L-211 was revoked and, therefore, will be unable to realize additional benefits by acceptance of the new recommendation. Several additional producers have withdrawn from the bar market during the past week and are reviewing orders already on books to uncover duplication of orders or purchases in excess of established quotas. Consumers which shifted to new bar suppliers during the war years now find it almost impossible to obtain required tonnages. Many of these firms face the possibility of being forced to close their plants until steel supply improves. No bar tonnages have been diverted from General Motors pipeline to other users, since suspensions of deliveries have been negligible. However, if the automobile plants are not reopened by the end of the year, finished products likely will be channeled to other industries.

Steel Plates . . .

Plate Prices, Page 195

Demand for steel plates continues to increase, notably in lighter gages, some producers now being sold through first half on these sizes. Heavier plates can be obtained in first quarter. Tank fabricators are principal buyers, with some ship and car building projects contributing to new buying.

Boston—What is happening to several other heavy hot-rolled carbon products is reflected in extended deliveries on lighter plates, notably 3/16-inch, resulting in unbalanced mill backlogs. As in shapes and bars the shift has been to lighter sizes, with uneven distribution to mills. Some light mills are sold practically through second quarter, compared with March on heavier material. More activity is noted in surplus stocks, with 1260 tons sold during the latest compilation period. Of this, 495 tons went to a warehouse, Merrill & Usher, Worcester, Mass., and 268 tons to Massachusetts Engineering Co., Quincy, Mass.

Philadelphia—Little easing is noted in demand for light plates. Some producers are sold through practically entire first half on 3/16-inch plates and are rejecting solid carlots of such sizes unless accompanied by specifications for heavier gages. This demand is mainly for under-

OFFERING SELECTIVITY
in Standard and Special
WIRE CLOTH & WIRE PRODUCTS
Buffalo Wire

Scan the list of *your* wire cloth and wire product needs. Note the high percentage you can meet *exactly* through "Buffalo Wire".

More than likely you'll reach the same conclusion as thousands of other plant operating men, purchasing agents and engineers the nation over: . . . that in dealing with "Buffalo Wire" you have *selectivity*—the opportunity of choosing from an unusually large and diversified line the products that *best fit your* own applications and operating conditions.

WIRE CLOTH . . . unusually wide selection of weaves, crimps, metals, mesh and wire sizes. *Request Catalog 12.*

METAL AND WIRE CLOTH PRODUCTS . . . complete production services for fabricating finished products — trimming, die-cutting, binding, soldering, welding, galvanizing, paint spraying. *Request Folder 594.*

BASKETS . . . types and sizes to meet any operating conditions and applications. *Request Folder 595.*

RIDDLES . . . not only the broadest line, but many times over the most durable and efficient. "Standards" for hand riddles, gyratory bottoms and shaker screens. "Specials" for any requirement. *Request Folder 591.*

WINDOW GUARDS . . . to meet every need of industry. Custom made in a broad variety of materials and styles for best protection, durability and appearance. *Request Folder 592.*

MANUFACTURER OF ALL TYPES OF WIRE CLOTH FOR OVER 76 YEARS

Buffalo WIRE WORKS CO., INC.
ESTABLISHED 1869 AS SCHEELER'S SONS

437 TERRACE BUFFALO 2, N. Y.

ground tanks, with some of it rather speculative in character. Heavier gages still can be picked up for late February and March, though some producers have nothing to offer for first quarter. Substantial export demand for plates still prevails, from many countries.

Birmingham—Plate output remains at approximately 65 to 70 per cent of capacity currently, but with no appreciable slackening in demand, which continues heavy especially from tank producers.

Tubular Goods . . .

Tubular Goods Prices, Page 195

Pittsburgh — Demand for cast iron pipe is not expected to show much improvement until spring, when municipal work is expected to get under way. Producers' stocks are low and production is restricted, with backlogs extended two to three months among leading interests. Sellers are booked into late February and March on standard merchant items, with somewhat earlier deliveries available on pressure and mechanical tubing. There is a wide spread in jobbers' inventories, with some reporting inadequate stocks, with the reverse true in a few instances. Several pipe lines are projected, ranging from 70 miles to over 700 miles, as in the case of the Texas-California line, but these are being held up pending disposition of government lines built during the war. Bids will be taken Dec. 12 by the Navy's surplus goods disposal office here on over 3000 pieces of cold-drawn boiler tubing located at Pittsburgh Steel Co.'s Allenport, Pa., plant. The same office will close bids Dec. 12 on 1392 tons of commercial quality steel billets and about 400 tons of seamless tubing located at Babcock & Wilcox Tube Co.'s Beaver Falls, Pa., plant.

Cleveland—At least one pipe producer in this district has been able to increase production, having placed its butt-weld pipe mills on a 20-turn weekly basis. The company's other pipe facilities are operating at about 75 per cent of capacity. Some mills have been forced to reduce quotas in order to try to catch up on deliveries which fell far behind schedule in October during the fuel shortage. While most sellers have been on a strict quota system, others have been accepting business on a direct shipment basis. However, practically all sellers now have withdrawn on the latter basis since deliveries extend into fourth quarter next year.

New difficulties have developed under the quota system of some companies due to a change in demand for various types of pipe. Quotas were on the basis that 75 per cent of total demand would be for butt-weld. It is now found the percentage for butt-weld is 90 per cent in some instances. Tonnage of lap-weld is dropping steadily with several producers curtailing or discontinuing production of this item.

You'll find the qualities you want
AT
"CHICAGO SCREW"
Our experience in manufacturing new, or unusual intricate screw machine products, in a minimum of operations, with great precision, and at reasonable cost, is available to you. Our organization is well qualified to give you the finest in screw machine craftsmanship.
THE CHICAGO SCREW CO.
ESTABLISHED 1872
1026 So. Homan Avenue Chicago 24, Ill.

Wire . . .

Wire Prices, Page 195

Boston — Withdrawal or reduction of tonnage to this area on the Worcester base by some rod producers is tightening semifinished supply. Several mills regularly supplying nonintegrated units have curtailed allotments to New England and with demand strong for cold-heading stock burden of New England production has increased materially, with second quarter schedules filled on some grades. Inquiry for drawn wire is unabated, with most schedules filled through second quarter. Demand for high-carbon grades in fine wire is strong.

Chicago—So great is demand for manufacturers' wire that some equipment producing certain types and sizes are currently 18 months to two years behind. All merchant products also are far short of meeting demand. All indications are that demand for nails will be tremendous, for the lumber production goal for 1946 has been set at 7 per cent over 1945.

Tin Plate . . .

Tin Plate Prices, Page 195

Pittsburgh — No further easing in the tin plate order M-81 is probable until there is a more detailed clarification of the overall tin supply situation. It is held that lifting of controls over use of tin at this time would result in rapid dissipation of tin stocks, seriously affecting supplies either for essential food preservation or minimum industrial requirements, It is doubtful whether tin plate output could be enlarged substantially under present conditions of short labor supply and general tight supply of steel. It appears that it will be some time before permission will be granted

to use tin plate in beer containers, dog food cans, etc. Producers are booked well into second quarter and in general have not yet opened books for third quarter. Despite reduction in overall steel output due to the coal strike, tin plate operations were little affected and total production for fourth quarter is expected to reach 875,000 tons, bringing full year output to about 3.5 million.

Chicago—Although output of tin plate is limited by manpower and allocation of tin, operations currently are slightly higher than in recent weeks. One important producer which has been suffering lack of box cars reports this situation has improved appreciably. At present, it is operating two of its four electrolytic tin lines.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 195

New York—Bolt and nut makers are confronted with more tonnage than they can handle because of difficulty in getting steel. Backlogs average six to eight weeks and beyond in some instances. In spite of the decline in some lines, particularly in shipbuilding, and the automotive strike, there is considerable activity. Incidentally, the General Motors tie-up to date has resulted in few suspensions, tonnage being produced and stored in commercial warehouses where necessary. Should this strike be prolonged, however, bolt and nut shipments will undoubtedly be affected. Export demand appears exceedingly heavy, but under present circumstances, with special reference to the difficulty in getting steel, much of it is being passed by. Even where companies have had long established agencies abroad they are being forced to limit their export business severely.

Rails, Cars . . .

Track Material Prices, Page 195

New York — Several freight car orders have been reported recently, including 1800 for the Canadian Pacific and 2100 small capacity gondolas for the Canadian Export Board. Also, inquiries are out for 100 passenger cars for the Union Pacific.

Locomotive activity includes 10 freight locomotives to be built by the Reading in its own shops and six 1000-horsepower diesel-electric switch engines for the Missouri-Kansas-Texas, to be built by Electro-Motive Division of General Motors Co., La Grange, Ill. Meanwhile the Western Maryland is inquiring for 10 freight engines of the 4-8-4 type and the Northern Pacific for six 4500-horsepower diesel-electric locomotives.

Structural Shapes . . .

Structural Shape Prices, Page 195

Boston — Industrial plant expansions, taking 100 to 300 tons, account for most activity in fabricated structural steel, with inquiry holding well. A substantial volume of this tonnage is going to district shops, backlogs with several being slightly heavier. Fabricators are reluctant to quote firm prices on some larger pending projects until costs are more clarified. Public works inquiry is slow, but in view of tightness in plain material, notably smaller sizes, this may be fortunate. Structural mill backlogs are unbalanced, topheavy on 10-inch and under. Pressure for shapes by warehouse is also strong.

Philadelphia — Shape backlogs continue to grow. Sellers have little to offer for first quarter, with some producers in May and beyond on standard sections, moving cautiously in acceptance of tonnage and with building construction still far from full swing. One eastern producer has withdrawn from the market on smaller bar shapes, beams and channels for shipment after March.

Pittsburgh — Structural mills are booked into second quarter on angles 6 x 6 inches and under, channels 15 inches and under. Other sizes are available in late first quarter. Inquiry is heavy, although a number of jobs are held up due to shortage of draftsmen and design engineers. Much municipal work, primarily for bridges, is not likely to reach the bidding stage until early spring at the earliest. Fabricators are booked through first quarter and report some projects being held up by lack of steel. The expansion program of Columbia Steel Co., a unit of the U. S. Steel Corp., is indicated as a large one in view of an award of 10,300 tons of fabricated structural steel to American Bridge Co. for a sheet and tin mill building at Pittsburg, Calif.

Chicago — With output of standard shapes far below needs and fabricating shops limited by inadequate manpower, steel constructors are forced to refuse new inquiry. Contrary to normal conditions in which fabricators seek work,

ROSS
COOLERS NEED THIS EXTRA STRENGTH FOR HIGH PRESSURE OIL
For continuous performance under higher-than-normal oil pressures, a cooler must be of exceptional sturdiness. The success of Ross Extra Heavy "BCF" Coolers on hydraulic presses and injection molding machines (Lester installation illustrated) bears this out conclusively.
What's particularly favorable about the Ross design, to press builders and users, is the achievement of this extra sturdiness without sacrifice of compactness. Materials are selected from the standpoints of strength and durability while maintaining minimum weight. All the other factors of high heat transfer rate, easy maintenance and ability to be mounted in any position are the same as the regular Ross "BCF" line so widely used for Diesel and gas engines, reduction gears, thrust bearings and turbines.
A Ross engineer will gladly discuss your installation with you. Write for details.
ROSS HEATER & MFG. CO., INC.
Division of American Radiator & Standard Sanitary Corporation
1431 WEST AVENUE
BUFFALO 13, N. Y.
Ross equipment is manufactured and sold in Canada by Horton Steel Works, Ltd., Fort Erie, Ont.

invitations to bid are ignored and contractors are forced to seek out fabricators. This tends to cause some postponements, but sufficient volume remains active to keep fabricators under pressure.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 195

New York — New York Housing Authority is again taking bids Dec. 12 on its Elliott Houses project, this time on foundation work only, with superstructure bids later. This project has been up four times, with no bidders on the first three occasions and with bids well over appropriations the fourth time. Foundation work will require 250 tons and superstructure 760 tons.

Pig Iron . . .

Pig Iron Prices, Page 197

Pig iron needs continue to exceed supply and with producers and melters unable to build up inventories winter shortage is feared. Labor supply in foundries is easing but still is a handicap. Considerable substitution of grades is practiced to make available supply cover as many needs as possible.

New York—With foundry melt expanding and cast scrap increasingly scarce and with consumers endeavoring to build up stocks as much as they are permitted under Washington regulations, because of the possibility of a steel strike later on, pig iron producers are being hard pressed for tonnage. Certain producers are setting up shipments for first quarter on a quota basis, allowing consumers only as much iron as they have been consuming on an average over the past several months.

In view of the heavy volume of work in prospect and the possibility of widespread labor disturbances in the steel industry later on, consumers are in no way being influenced by the approaching year-end inventory season. As a matter of fact, under the Washington regulations they are permitted to store only a month's supply at most, and there are a number who have not been able to build up this much supply. Livelier interest is noted in first quarter contracting.

Scarcity is also reflected in substitutions of one analysis for another, not only to the extent that there is an interchange of one grade of foundry for another, but also in certain instances a substitution of malleable for foundry iron.

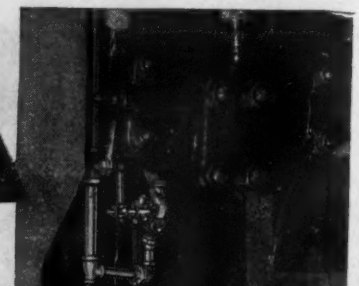
Philadelphia—Trading in pig iron is brisk and while shipments in most cases are sufficient to meet current needs they are not in general as heavy as desired. Some producers are setting up quotas based on average shipments over recent months, in an effort to supply as equitable a tonnage as possible. All producers are screening inquiries closely. First quarter buying is gaining momentum rapidly. Foundry melt in general is increasing, as more labor now appears available than at any time since the end of the war. However, much additional labor is needed, especially in gray iron foundries, which are being overwhelmed by specifications.

Pittsburgh—Labor shortage continues an important factor retarding full utilization of available blast furnaces. While supply of pig iron is in close balance with requirements, no foundries have had to curtail operations due to lack of iron. From the foundry viewpoint shortage of cast scrap currently is more important. However some easing in manpower is developing which should permit increased castings output and result in greater demand for iron. Foundry interests report no significant shipping hold-ups have resulted yet from the strike at General Motors plants, for many interests are seeking this opportunity to build up bank of finished parts. Suspension of deliveries on automotive tonnage easily could be offset with the huge backlogs of orders for machine tool, railroad, agricultural and other equipment manufacturers.

Buffalo — Merchant iron sellers find bookings for first quarter indicate demand will exceed supply. A further tightening factor is failure of producers to build reserve stocks and foundries are operating hand-to-mouth. Temporary suspension of shipments to automobile castings foundries has enabled producers to close the gap between shipments and overflow orders. Production in the current quarter will be short of the prior period because of the coal strike.

Chicago—Demand for pig iron is strong. Supply is only a jump ahead of consumption, but inadequate to permit expanding of inventories. Blast furnace operations have only recently reached the level prior to the coal strike. The situation still requires allocation and

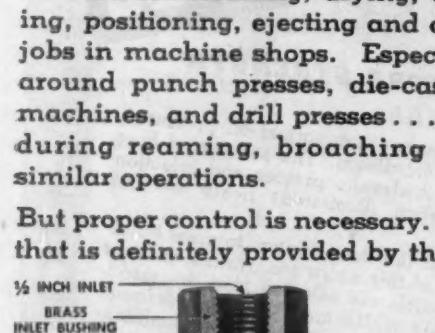
Tap Into Your AIR LINE for Other Jobs!



Compressed air—properly controlled—can do many kinds of work. Can be used for cleaning, drying, cooling, positioning, ejecting and other jobs in machine shops. Especially around punch presses, die-casting machines, and drill presses . . . and during reaming, broaching and similar operations.

But proper control is necessary. And that is definitely provided by the

AIR SAVER
BLOW VALVE



It's really leak-proof under any condition of automatic intermittent operation. Mounts in any position and operates at any angle. Easy to install. Provides extra large air volume, also ample volume for multiple jets operating singly or together. Not affected by vibration.

Designed and built by Briggs & Stratton engineers for use in their own plants. Now made available to air users nationally by Palmer-Shile. Prompt deliveries.

Item B-50
Complete Assembly
Includes Valve, Mounting Rods, Operating Cam.
$12.50

Item B-100
(Valve Alone)
$10.00

Palmer-Shile Co.
796 So. Harrington St. DETROIT 17, MICHIGAN

precise control of shipping schedules. Carnegie-Illinois Steel Corp. has taken off its Gary No. 10 blast furnace for relining, which leaves 34 of the district's 41 active.

Cincinnati—Demand for December pig iron shows a marked upturn over recent months. Some foundries are steadily expanding melt and all district interests show desire for heavier stocks, none recently maintaining allowed 30-days' supply. Despite moderately easier labor situation, which permits heavier production, output of castings fails to meet requirements.

Birmingham — Seventeen furnaces are in production, including captive stacks. Merchant iron producers are urging that needs be placed under contract to assure regular deliveries. Production and demand maintain close balance.

Scrap . . .

Scrap Prices, Page 198

Supply of scrap is far below needs and in some cases melters are taking material from reserves. In the main sufficient scrap is being uncovered to meet current needs but backlogs for winter are not as large as usual at this time. Competition is keen for tonnage and full springboards are being paid, with freight equalizations far larger than normal.

Philadelphia—Scrap demand is becoming more acute. All leading consumers are pressing for tonnage, heavy melting steel as well as borings, turnings and cast grades. Unprepared steel scrap is being snapped up at high prices. A recent lot of 1000 tons at the Philadelphia Navy yard was taken by a dealer at $19.27, several dollars a ton over the $14.01 ceiling which consumers are permitted to pay, and which was bid.

Buffalo—Scrap is tight as dealers, in face of decreasing yard receipts, have booked orders for 25,000 tons. These orders are expected to be covered mainly from material now in dealers' yards. Industrial scrap has fallen to an estimated 60 to 75 per cent of normal. This is attributed to strikes interfering with recoversion plans of major industries. With steelmaking at a high level mills press for material and fear winter shortage. Recent snowfalls make yard preparation difficult. Two more cargoes by lake, about 10,000 tons, close the navigation season. There is a report that one consumer has contracted for scrap shipment by lake in 1946.

Cleveland—Conditions have tightened in the scrap market and melters are using every device to obtain supplies, springboards up to $1.25 being paid and in some cases considerable freight equalization. Low phos grades continue to go to open-hearth melters and electric furnace operators are pushed to obtain their requirements. Available supply is being spread to best possible advantage.

Pittsburgh—It is becoming increasingly difficult to meet demand for heavy melting steel and cast scrap, although consumers are paying higher freight equalizations than at any time in the recent past. In at least one instance $5.50 springboard on cast scrap has been met. Up to $1 freight equalization continues to be made for machine shop turnings and short shoveling turnings, while $1.50 springboard on heavy melting steel has become general. Indicative of the general tight situation in scrap supplies, Luria Bros. & Co. Inc., recently paid above ceiling price of $14.61 per ton for 10,000 tons of steel landing mat scrap from the Third Army Service Command, Norfolk, Va.

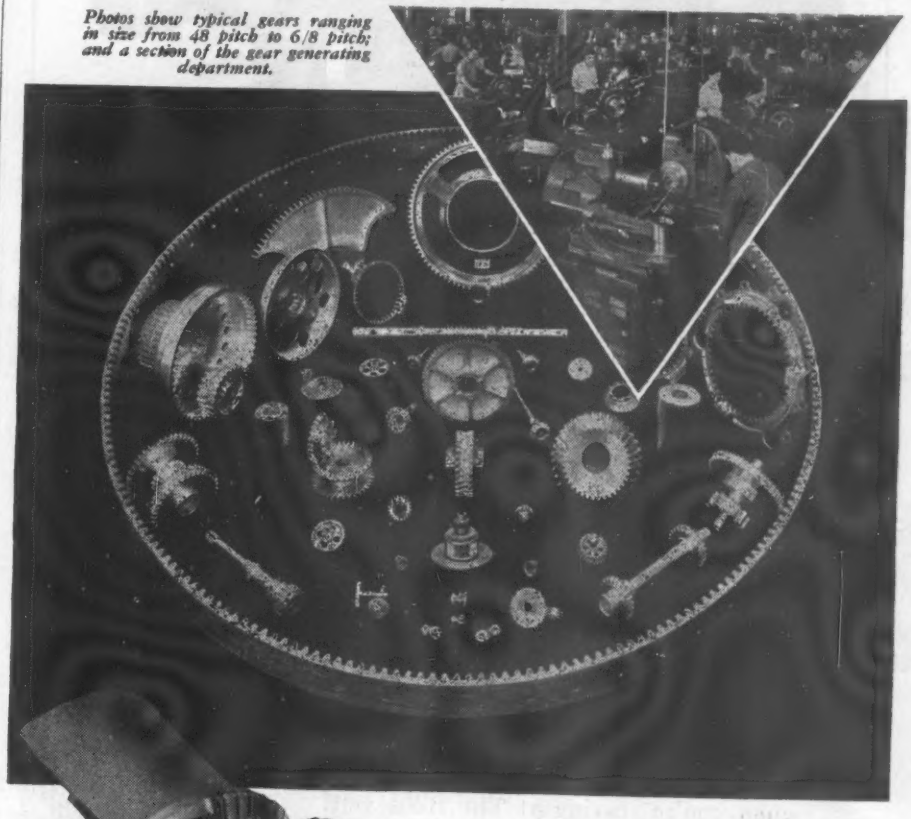
Chicago — High consumption and need for strengthening inventories combine to keep scrap demand high. Material available in the area is insufficient and some consumers are tapping remote areas and paying springboard. In a few instances, scrap is being consumed faster than it is replaced.

Detroit — Drying up of scrap supplies from strikebound General Motors sources has tightened the market further. All prices continue firm at ceilings, and both mills here are buying steadily, including electric furnace grades for use in open hearths. Demand for foundry scrap has tapered, but increased pressure on open-hearth varieties more than offsets this deficiency.

New York — Strong pressure continues for all major grades of scrap. Pittsburgh consumers and eastern Pennsylvania buyers are active. Pittsburgh consumers of heavy melting steel are even taking electric furnace scrap, paying premiums of $1 to $2.50, depending on grade and also paying exceptionally high springboard for material from the East. Luria Bros. recently bought 2000 tons of landing mat scrap at the government disposal plant in Brooklyn, paying $14.72, loaded on barge.

St. Louis—Scrap shipments have begun to decline with increasingly bad weather and a manpower shortage of 40 to 50

Photos show typical gears ranging in size from 48 pitch to 6/8 pitch; and a section of the gear generating department.



GEARED FOR PRECISION WORK

COMPLETE FACILITIES in skilled workmen and modern equipment are available for your precision gear requirements.

TYPES AND SIZES—We are equipped to generate spur gears from 3 diametral pitch, and 42" diameter, on down; straight bevel gears, to maximum of 12" diameter; helical gears; worms and worm wheels; and many other forms including profile work, splines and ratchets.

PRECISION THRU TWO WARS—The engineering, development and manufacturing of gears, aircraft parts and units for the Armed Forces, *over a period of two wars,* have helped us perfect the essential element in gear generating—*Precision.*

Your inquiry regarding gears, contract manufacturing, special machines, Brehm trimming dies or Combustioneer automatic coal stokers, will quickly place at your disposal all of our experience and facilities, without obligation.

Write for Tour Booklet showing views of our plants and some of our products.

THE STEEL PRODUCTS ENGINEERING CO.
1206 W. COLUMBIA STREET SPRINGFIELD, OHIO

Now Welders Can Spend Their Time Welding

C-F POSITIONERS

Without C-F Positioners, much of the time consumed in the fabrication of large weldments is *handling time*, time spent lifting, flopping, and propping up weldments into position for each new pass. Added to each hour of actual welding time is the cost of crane time, sling crews, and above all, continuous interruptions and delay.

How different where C-F Positioners rotate great weldments under push button control. Here welders can spend their time welding—welding all sides and all angles as they should be welded "down hand."

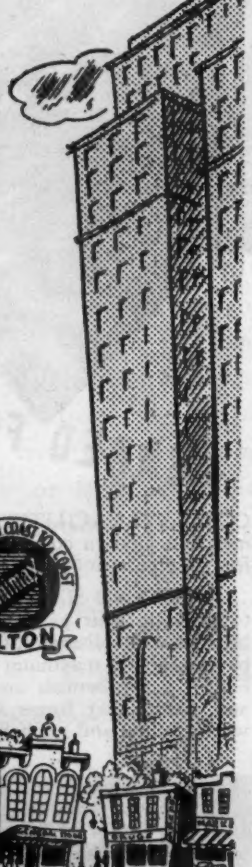
There are C-F Positioners in capacities from 1200 lbs. to 30,000 lbs. Manual or motor driven. Write for Bulletin WP-22.

CULLEN-FRIESTEDT CO.

1308 S. Kilbourn Ave. Chicago 23, Illinois

NEW YORK IS A SMALL TOWN

when you're staying at The Roosevelt! All the best of Manhattan is within comfortable walking distance of this mid-town hotel, known for Hilton hospitality. Rooms with Bath from $4.50.



HOTEL ROOSEVELT

Dean Carpenter, Gen. Manager

MADISON AVENUE AT 45th STREET, NEW YORK

HOTELS FROM COAST TO COAST — HILTON

Other Hilton Hotels Include:

Chicago: The Stevens
Dayton: The Dayton-Biltmore
Los Angeles: The Town House
C. N. HILTON, PRESIDENT

DIRECT ENTRANCE TO GRAND CENTRAL TERMINAL

per cent. Processing labor is particularly short and remote shipping points report similar distress. Mills are beginning to go into reserve stocks, which have dropped to about 30 days. Chicago, left short of scrap during the coal dispute, has been bleeding this area somewhat and local mills have to reach out greater distances at greater cost. Foundry reserves are reported fair. Heavy melting steel is in big demand and rails are moving freely.

Cincinnati—Iron and steel scrap is strong, and all grades are moving with facility. District melters, although willing to accept material, are well enough stocked to avoid tonnage carrying higher freight charges. However, nearby districts are inquiring for material here, willing to pay springboards. Foundries are trying to expand the melt, and in face of a tight pig iron supply are avid for good cast scrap, which is becoming scarce.

Seattle—Ample high-grade scrap is available in this area, shipyards supplying most, with other sources also contributing. Price is steady at $10 per gross ton, delivered. No scrap is being shipped from the Seattle area but some tonnages are reported moving from Portland, Oreg., to eastern mills. It is reported that as of Dec. 28 rail rates will be reduced from $14.78 per ton to $12.32 on scrap shipped from the Pacific area. Inventories are about normal and increasing slightly.

Warehouse . . .

Warehouse Prices, Page 196

Philadelphia — Warehouse business generally has reached the highest daily peak since the end of the war and in some instances since V-E Day. Demand is widespread, involving a variety of products and composed chiefly of small orders. Incoming mill shipments are better than two or three weeks ago, although not sufficient to balance outgoing tonnage.

Pittsburgh — Steel distributors are still not getting replacement tonnage of steel products as fast as needed. Distributors' inventories are unusually low in relation to the high demand, particularly in sheets, small bars, and structural items. Movement of steel from warehouse matches that during the war, due to steady upturn in civilian goods production and the fact that many consumers who normally buy from mills attempt to make up the deficiency through warehouses. In some instances buyers are forced to take substitutes on a temporary basis.

Some price relief recently has been granted resellers through OPA's action, effective Nov. 30, in granting steel distributors of flat galvanized steel sheets permission to pass on half of the mill price increase of 20 cents per hundred pounds which they had been required to absorb since the higher mill price was established May 21 last.

Cleveland— Warehouse interests here have been unofficially assured that they will be permitted to pass on any increase that may be allowed on steel prices at the mill level when OPA reviews the situation after the first of the year. While warehouses, especially those handling secondary products which require more processing than the prime products, would like to have a wider price spread, the present price relation-

ship permits their active participation in the market. Upgrading of products by mills has reduced tonnage of seconds received by warehouses. This has intensified interest in disposals of surplus steel by private companies and government agencies. They are now receiving about 15 per cent of tonnages offered by the Reconstruction Finance Corp.

Iron Ore . . .

Iron Ore Prices, Page 196

Movement of Lake Superior iron ore to Dec. 1 this year totaled 75,643,715 gross tons, compared with 81,170,538 tons to the same date last year, according to the Lake Superior Iron Ore Association, Cleveland. This is a decrease of 5,526,823 tons, 6.81 per cent from the 1944 total. However, the last loading was done Nov. 28 last year while a small tonnage will be moved in December this year. This will not be sufficient to change the figures materially.

November shipments totaled 4,145,322 tons, a decrease of 527,044 tons, 11.28 per cent, from those of November, 1944. Details of November shipments are as follows, in gross tons:

	Nov., 1945	Nov., 1944
Escanaba	438,796	556,156
Marquette	308,110	224,919
Ashland	237,811	309,377
Superior	1,280,417	1,275,158
Duluth	860,591	998,144
Two Harbors	936,995	1,245,889
Total U. S. Ports	4,062,720	4,609,643
Michipicoten	51,707	62,724
Port Arthur	30,895	.....
Total Canada	82,602	62,724
Grand Total	4,145,322	4,672,367

Decrease from year ago, 527,044 tons, 11.28 per cent.

Season shipments to Dec. 1 have been as follows:

	To Dec. 1, 1945	To Dec. 1, 1944
Escanaba	4,640,370	5,778,300
Marquette	3,890,974	3,730,262
Ashland	4,308,671	5,578,853
Superior	24,536,819	25,939,951
Duluth	20,036,365	20,332,214
Two Harbors	17,625,890	19,331,761
Total U. S. Ports	75,039,089	80,691,341
Michipicoten	466,644	479,197
Port Arthur	137,982	.....
Total Canada	604,626	479,197
Grand Total	75,643,715	81,170,538

Decrease from year ago, 5,526,823 tons, 6.81 per cent.

Steel in Europe . . .

London — (*By Radio*) — Sheet mills in Great Britain are filled for six months. Heavy structural production is improving. Plate mills are well supplied with business and are active. Pig iron output is rising. Steel billets from the Dominions have begun to reach Great Britain. Shortage of imported semifinished steel began to be felt with the end of lend-lease but Iron and Steel Control has bought necessary supply from Australia and Canada and deliveries now are materializing.

Canada . . .

Toronto, Ont.—Railroad rolling stock buying has been an active feature and has been reflected in increased steel buying. Steel demand as a whole is widely diversified and covers practically all materials, with current bookings largely for delivery toward the latter part of first quarter. Producers have not opened books for second quarter and on most items are filled for first quarter and some have withdrawn from the market.

Rolling stock builders have been more active recently and have placed large orders for first quarter.

Production of iron and steel in Canada showed a small gain in October but was down from October, 1944. October pig iron output was 140,693 net tons, or 60.9 per cent of rated capacity and compares with 58.5 per cent in August. Output of steel ingots and castings at 205,846 net tons represents 68.1 per cent of rated capacity and compares with 65.7 per cent in September. October's production included 198,185 tons of steel ingots and 7,661 tons of castings.

Following are comparative production totals in net tons:

	Steel Ingots Castings	Pig Iron	Ferro-alloys
Oct. 1945	205,846	140,693	14,555
Sept. 1945	198,508	135,227	13,517
Oct. 1944	275,524	154,119	15,631
10 Mos. 1945	2,454,061	1,508,082	158,162
10 Mos. 1944	2,517,005	1,566,504	154,757
10 Mos. 1943	2,509,712	1,478,760	185,480

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

10,304 tons, sheet and tin mill building, Pittsburg, Calif., for Columbia Steel Co., to

New Precision Built Roto Center Eliminates Chatter . . . Speeds Production!

Now You Can replace dead centers on lathe and grinder tailstocks, with this new Keene live Roto Center—to increase production—to eliminate all radial play and possibility of chatter! Low in cost, the Roto Center is a high capacity unit, featuring many innovations to speed and improve quality of work!

Matched roller bearings preloaded, are packed with high grade anti-friction grease at assembly. No attention is required for long periods. After assembly, runout is kept to absolute minimum—guaranteed less than .0002. Rear of center is tapped to receive standard hydraulic fitting. Chips, dust and cutting oil cannot reach bearings!

More and more peacetime "helps on the job" are returning to industry. One of these days, famous, flavorful Wrigley's Spearmint Gum will also be back to help you "on the job"—but only when we can assure Wrigley's Spearmint manufacture in *quantity* and *quality* for all. Today, we ask you to remember the famous Wrigley's Spearmint wrapper. Tomorrow, you may again enjoy Wrigley's Spearmint Gum quality and flavor while you are at work.

You can get complete information from Keene Electrical Machinery Co., 549 W. Washington Blvd. Chicago 6, Ill.

The Keene Roto Center

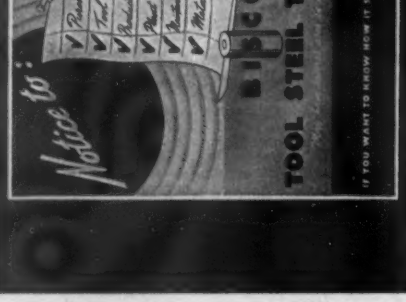
Remember this wrapper

Z-94

You Can Cut Your Machining Cost.

This new catalog describes tool steel tubing, which provides many short cuts in the manufacture of tools, dies and hardened parts. Write TODAY for your FREE copy.

THE BISSETT STEEL COMPANY
945 EAST 67TH STREET • CLEVELAND 8, OHIO



American Bridge Co., Pittsburgh.

1450 tons, factory, Brawley, Calif., for Holly Sugar Corp., to Consolidated Steel Corp. Ltd., Los Angeles; bids Nov. 26.

1000 tons, caissons for highway bridge, Memphis, for State Highway Commission, to Virginia Bridge Co., Roanoke, Va.

900 tons, expansion Sattler's Department Store Inc., Buffalo, to R. S. McMannus Steel Construction Co., Buffalo, Siegfried Construction Co., Buffalo, contractor.

800 tons, warehouse for Truscon Steel, to Republic Steel Corp., Cleveland.

465 tons, building B, Peoria, Ill., for Caterpillar Tractor Co., to Joseph T. Ryerson & Son Inc., Chicago.

232 tons, two-story plant addition, United Wire & Supply Co., Cranston, R. I. to Tower Iron Works, Providence; Gilbane Building Co., Providence, general contractor; Truscon Steel Co., Boston, awarded reinforcing bars.

210 tons, addition for National Paper Co., Ransom, Pa., to Bethlehem Steel Co., Bethlehem, Pa., through Sardoni Construction Co., Philadelphia.

200 tons, expansion Durez Plastics & Chemicals Inc., North Tonawanda, N. Y. to R. S. McMannus Steel Construction Co., Buffalo Siegfried Construction Co., Buffalo, contractor.

175 tons, plant addition for Owens-Illinois Glass Co., Bridgeton, N. J., to Phoenix Bridge Co., Phoenixville, Pa.

140 tons, truck terminal, Jersey City, N. J., to Belmont Iron Works, Philadelphia.

120 tons, 105 x 145-foot addition, Safety Car Heating & Lighting Co., Hamden, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Dwight Building Co., New Haven, Conn., general contractor.

STRUCTURAL STEEL PENDING

2700 tons, Dayton, O., for Loose-Wiles Biscuit Co.

1800 tons, Federal Telephone Laboratories, Clifton, N. J.; general contract to Turner Construction Co., 420 Lexington Ave., New York.

1700 tons, suburban store for R. H. Macy & Co., Jamaica, Long Island; Vermilya-Brown, 100 East 42nd St., New York, general contractor.

1500 tons, power house, Whiting, Ind., for Standard Oil Co. of Indiana; Stone & Webster, Boston, engineers.

1200 tons, power house, Alma, Wis., for Rural Electrification Administration; Vern E. Alden, Chicago, engineer; bids Dec. 7.

1000 tons, new plant, Chicago, for Alco-Gravure Division, Publication Corp.

850 tons, building, Chicago, for Clearing Industrial District; bids Dec. 4.

800 tons, column cores and other shapes for plant addition for Pfizer Co., Brooklyn; W. J. Barney, 101 Park Ave., New York, general contractor; 400 tons reinforcing steel also required.

460 tons, factory building, Morton Grove, Ill., for Baxter Laboratories Inc.; bids Dec. 4.

370 tons, power station, San Benito, Tex., for Central Power & Light Co., bids Nov. 30.

350 tons, addition to parts warehouse, Minneapolis, for General Motors Corp.

250 tons, building for special products division, Nekoosa, Wis., for Nekoosa-Edwards Paper Co.

230 tons, caisson for spillway, Coulee Dam; Consolidated Steel Corp., Los Angeles, low.

210 tons, building, Chicago, for B. T. Babbitt Inc.

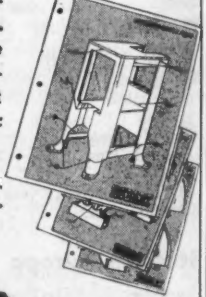
200 tons, outlet pipes and steel heads for outlet works, Anderson Ranch Dam, Idaho; Willamette Iron & Steel Corp., Portland, Oreg., low, $33,982.

180 tons, factory, Willow Park, Ill., for Wander Co.; Shaw, Naess & Murphy, Chicago, architects; bids Nov. 26.

150 tons, building for West Co., Phoenixville, Pa.

Unstated, $1,000,000 expansion by Rudolph

Have you thought about using more arc welding in your post-war production? More and more manufacturers see the value of arc welding for producing vital war materials . . . they know what it can do. We at Hobart value their judgment . . . not only from the standpoint of more arc welding . . . but for the type of welding equipment they will buy. They will compare all welding machines . . . feature for feature . . . and their decision will be Hobart "Simplified" Arc Welding.



HOBART BROTHERS CO.
BOX ST-1251, TROY, O.

"Practical Designs for Arc Welding" Initial series FREE! Write today!

HOBART
"One of the World's Largest Builders of Arc Welders"

Wurlitzer Co., North Tonawanda, N. Y.

REINFORCING BARS . . .

REINFORCING BARS PLACED

800 tons, Sears, Roebuck & Co. building addition, Seattle, to Bethlehem Pacific Coast Steel Co., Seattle.

700 tons, color film processing plant, Eastman Kodak Co., Rochester, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through Ridge Construction Co., Rochester, N. Y.

300 tons, factory buildings, Westinghouse Electric Corp., Mansfield, O., to Bethlehem Steel Co., Bethlehem, Pa., through Dick Construction Co., Pittsburgh.

250 tons, addition, Racine, Wis., for Western Printing & Lithographing Co., to Worden-Allen Co., Milwaukee.

148 tons, addition, Elgin State hospital, Elgin, Ill., to Ceco Steel Products Corp., Cicero, Ill.; Federal Constructors, Not Inc., Chicago, contractor; bids Nov. 27.

200 tons, aspirin plant addition, Bayer Co., Trenton, N. J., to Truscon Steel Co., Youngstown, O., through The Austin Co., New York.

130 tons, expansion Durez Plastics & Chemicals Inc., North Tonawanda, N. Y. to Truscon Steel Co., Buffalo.

REINFORCED BARS PENDING

3000 tons, Hotel Plaza terrace and department store, Cincinnati.

685 tons, warehouse, Detroit, for Hudson Store.

500 tons, engineering building 137, Chrysler Corp., Highland Park, Mich.

300 tons, building, Procter & Gamble Co., St. Bernard, O.

230 tons, addition, Spencer, Wis., for Dairy Belt Cheese & Butter Co.

200 tons, Plaza building, St. Louis.

150 tons, waterworks, Ypsilanti, Mich.

PIPE . . .

CAST IRON PIPE PLACED

490 tons, stock for inventory, Seattle water department, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

100 tons, Oak Lodge district, Portland, and local improvement, Seattle, to H. G. Purcell, Seattle.

CAST IRON PIPE PENDING

2000 tons Eighth Ave. S. W. improvement, Seattle; bids in.

500 tons, local improvements, Tacoma; bids Dec. 10.

500 tons, inventory stocks, Portland; bids Dec. 4.

200 tons, 24,000 feet 6, 8 and 10-inch for Pasco, Wash.; bids Dec. 18.

RAILS, CARS . . .

RAILROAD CARS PLACED

Canadian Export Board, 2100 twenty-five-ton gondola cars, to National Steel Car Corp., Hamilton, Ont.

Canadian Pacific, 1800 freight cars, comprising 1000 steel box cars, of which 950 will be built by Canadian Car & Foundry Co., Montreal, and 50 by the Eastern Car Co., New Glasgow, N. S.; 500 fifty-ton automobile cars, 250 fifty-ton refrigerator cars and 50 seventy-ton air dump cars, all going to National Steel Car Corp., Hamilton, Ont.

Canadian National, 10 baggage cars and 5 mail express cars, to National Steel Car Corp., Hamilton, Ont.

Clinchfield, 20 seventy-ton hopper cars to American Car & Foundry Co., New York.

Norfolk & Western, 100 seventy-ton hopper cars, to own shops in Roanoke, Va.

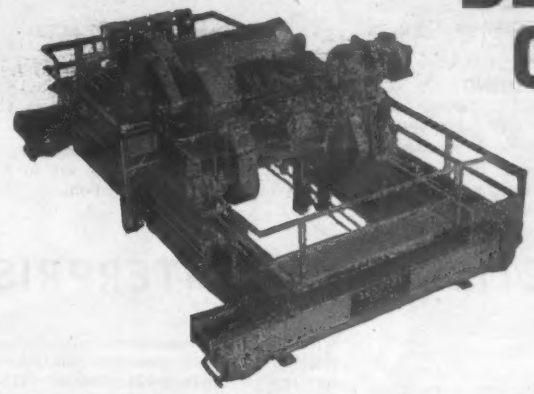
Minneapolis & St. Louis, 50 seventy-ton hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

Montour, 200 fifty-ton hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

Reading, 100 seventy-ton covered cement hop-

Crane Builders Since 1903

BEDFORD CRANES



Capacities:

5 to 150 TONS

ANY SPAN OR LIFT

Designed and Engineered to meet Your Requirements

Send for Your Copy of Crane Catalog

ELECTRIC OVERHEAD TRAVELING CRANES
GANTRY CRANES • STEEL DERRICKS
BUILT TO YOUR SPECIFICATIONS
STRUCTURAL STEEL • STEEL BUILDINGS
AIRPLANE HANGARS

Engineers Designers Fabricators

BEDFORD FOUNDRY & MACHINE CO.
Bedford, Indiana, U.S.A.

Gray Iron Castings

Any Questions ?..

Regarding

GALVANIZED PRODUCTS AND PRODUCTION HEAT TREATING

Commercial Metals Treating, Inc. is ready at all times to assist you with your present and post-war metals treating problems. We have greatly expanded our facilities to care for urgent war time needs and will soon be able to handle pieces up to 20 in length in galvanized products. While it is imperative that war time schedules be maintained, plans must also be made for post-war cut-overs and heavy peacetime production needs. We invite your inquiries regarding these vital problems and we feel sure we can be of assistance to you.

Manufacturers of

GALVANIZED & FABRICATED WELDED TUBING

TENT POLE HARDWARE

"A Material Difference"

COMMERCIAL METALS TREATING, INC.

TOLEDO OHIO

per cars, to own shops in Reading, Pa.

Temiskaming & Northern Ontario Railway Commission, 675 freight cars, comprising 600 fifty-ton box cars and 75 seventy-ton hopper cars, to National Steel Car Corp., Hamilton, Ont.

Wheeling & Lake Erie, six 70-ton hopper cars, to General American Transportation Corp., Chicago.

RAILROAD CARS PENDING

Baltimore & Ohio, 1400 fifty-ton steel box cars.

Union Pacific, 100 passenger cars; bids asked.

Northern Pacific, 24 sleeping cars, 12 baggage and mail cars and 6 dining cars, pending.

LOCOMOTIVES PENDING

Northern Pacific, six 4500-horsepower diesel-electric locomotives; pending.

Western Maryland, tent 4-8-4 type freight locomotives; bids asked.

LOCOMOTIVES PLACED

Missouri-Kansas-Texas, six 1000-horsepower diesel-electric switch engines, to Electro-Motive Division of General Motors Co., La Grange, Ill.

Reading, tent 4-8-4 freight locomotives, to own shops in Reading, Pa.; these are in addition to 20 now under construction.

CONSTRUCTION AND ENTERPRISE

OHIO

ALLIANCE, O.—Foremetal Co. has been incorporated with $500 capital and 250 shares no par value to manufacture sheet metal and other steel products, aircraft and automotive parts and household appliances. C. G. Taylor, 170 East Market St., is agent.

CANTON, O.—Gussett Boiler & Welding Inc., 1140 Marion Ave., has been incorporated to manufacture boilers, by George E. Gussett, agent, and associates.

CLEVELAND—G. F. Adler Brass Foundry, 1510 University Rd., will let contracts soon for four one-story plant additions, including 60 x 125-foundry, 40 x 125-foot core and pattern building, 40 x 40-foot furnace room and 35 x 40-foot office, to cost about $35,000. C. F. Gunther, 13124 Shaker Square, is architect.

CLEVELAND—Fortney Body Co., Burdette P. Fortney, president, has been incorporated with $100,000 capital to manufacture refrigerator truck bodies and has taken over former Ohio Aircraft Co. plant at 4413 Train Ave., to be in operation by first of year. Some additional equipment will be bought.

CLEVELAND—Steel Drum Packaging & Accessories Inc. has been incorporated with $7500 capital and 250 shares no par value to assemble steel containers at 2120 East Nineteenth St. Charles E. Schmidt is president, with offices with Tool Design & Sales Co., Carnegie Hall.

CLEVELAND—Berger Machine & Mfg. Co., care A. U. Berger, 9002 Madison Ave., will build a one story factory and office building 120 x 155 feet at 4031 West 150th St., to cost about $70,000.

CLEVELAND—General Electric Co., Nela Park, Cleveland, will build a manufacturing plant at Lexington, Ky., on a 15-acre tract at Russel Cave Pike and Belt Line railroad.

CLEVELAND—Cleveland Steel Products Co., 7306 Madison Ave., plans construction of a factory and office building at West 117th St. and Berea Rd., estimated to cost about $1 million. Plant will be 500 x 800 feet. Present plant will be continued in production.

CLYDE, O.—Clyde Porcelain Steel Co. has plans for rebuilding its plant at cost of about $100,000.

ELYRIA, O.—Elyria Molding & Equipment Co., Rudolph O. Fry, president, has been organized and has bought the former Harrison Tool Co. plant at 317 Prospect St. for manufacture of diecasting and plastic equipment.

NEWTON FALLS, O.—Falls Welding & Mfg. Co., G. M. Edwards, president, recently organized, plans to establish a plant on the site of the former Pilgrim Trailer Co. and will manufacture steel products, including earth moving machinery. Address is Rural Route No. 1, Newton Falls.

SEVILLE, O.—Akron Products Co., recently incorporated, has acquired a plant here for the manufacture of metal products. F. W. Knowlton, 1708 Englewood Ave., Akron, is agent. M. R. Brenner is president.

SPRINGFIELD, O.—Hydraulic Press Mfg. Co., Mt. Gilead, O., H. A. Toulmin, president, will build a plant here with 36,000 square feet floor space. Pump construction will be moved here from Mt. Gilead plant No. 1 and fabricating and press work will be done.

NEW YORK

JAMESTOWN, N. Y.—Jamestown Metal Corp., Hopkins Ave., plans alterations and additions to its plant, to cost about $50,000.

PENNSYLVANIA

NEW CASTLE, PA.—National Radiator Co., E. W. Longacre, vice president, 221 Central Ave., Johnstown, Pa., has let contract to Matthew Leivo & Sons, Lawrence Sav & Trust Bldg., for a one-story 50 x [illegible] foot foundry addition, to cost about $65,000.

WARREN, PA.—Pennsylvania Electric Co., W. C. Sontum, chief engineer, 222 Levergood St., Johnstown, Pa., plans an electric generating station costing about $4 million. Gilbert Associates, 412 Washington St., Reading, Pa., are engineers.

MASSACHUSETTS

CHELSEA, MASS.—Atwood & McManus Co., Vale St., has let contract to William H. Porter Co. Inc., 84 Arsenal St., Watertown, Mass., for a one-story 30 x 30 and 35 x 40-foot boiler plant. Cleverdon, Varney & Pike, 120 Tremont St., Boston, are engineers.

CONNECTICUT

BRIDGEPORT, CONN.—Locke Steel Chain Co., 1085 Connecticut Ave., has let contract to Gellately Construction Co., 25 Housatonic Ave., for a one-story 129 x 200-foot plant addition to cost about $115,000. Westcott & Mapes, 139 Orange St., New Haven, Conn., are architects.

BRIDGEPORT, CONN.—General Electric Co., Boston Ave., J. W. McNairy, engineer, will undertake plant alterations and additions to cost about $300,000 at Bond St. and Seaview Ave.

MICHIGAN

ALBION, MICH.—Brooks Furnace Co., 1712 Jackson Road, has been incorporated with 5000 shares no par value to operate a general foundry and machine shop, by Ralph E. Brooks, same address.

DETROIT—Structural Steel Corp., 15306 Twelfth St., has been incorporated with $50,000 capital to process and sell structural steel, by Hyman R. Nathan, same address.

DETROIT—Farm & Tractor Equipment Specialties Co., 2148 Penobscot Bldg., has been incorporated with $25,000 capital to manu-

SPECIAL MACHINERY BUILT ON CONTRACT

BENDING AND STRAIGHTENING MACHINES

PUNCHING AND SHEARING MACHINERY

THOMAS

Punching & Shearing MACHINERY

NOW SOLD BY LEADING DISTRIBUTORS COAST TO COAST

FOR THE STRUCTURAL SHOP, BOILER SHOP, SHIPYARD, RAILROAD CAR SHOP AND ALLIED INDUSTRIES

ATLANTA, GA. Chandler Machinery Co.
BALTIMORE, MD. L. A. Benson Co., Inc.
BIRMINGHAM, ALA. Quinn & Quinn
BOSTON, MASS. General Machinery Corp.
BUFFALO, N. Y. J. L. Osgood Machinery & Tool Co.
CHATTANOOGA, TENN. Noland Co.
CHICAGO, ILL. Bryant Machinery & Engineering Co.
CINCINNATI, O. Brokaw Machinery Co.
CLEVELAND, O. George D. Miller Co.
DALLAS, TEX. C. J. Harter, Machinery
DENVER, COLORADO Richard Ives Co.
GRAND RAPIDS, MICH. Joseph Monahan
HOUSTON, TEXAS C. J. Harter, Machinery
LOS ANGELES, CALIF. Harron, Rickard & McCone Co.
MILWAUKEE, WIS. Bryant Machinery & Engineering Co.
MINNEAPOLIS, MINN. Northern Machinery & Supply Co.
NASHVILLE, TENN. Noland Co.
NEW HAVEN, CONN. Giebel, Inc.
NEW ORLEANS, LA. Frederic & Baker
NEW YORK, N. Y. Giebel, Inc.
PHILADELPHIA Thomas Machine Mfg. Co.
PORTLAND, OREGON George E. Zweifel & Co.
RICHMOND, VIRGINIA Smith-Courtney Co.
ROCHESTER, N. Y. W. W. Wentz
SALT LAKE CITY, UTAH J. M. Grisley
SAN FRANCISCO, CALIF. Harron, Rickard & McCone Co.
SEATTLE, WASH. Dawson Machinery Co.
SHREVEPORT, LA. Frederic & Baker
ST. LOUIS, MO. Robert R. Stephens Machinery Co.
SYRACUSE, N. Y. C. H. Briggs Machine Tool Co., Inc.

For your requirements, consult the distributor nearest you

7

THOMAS

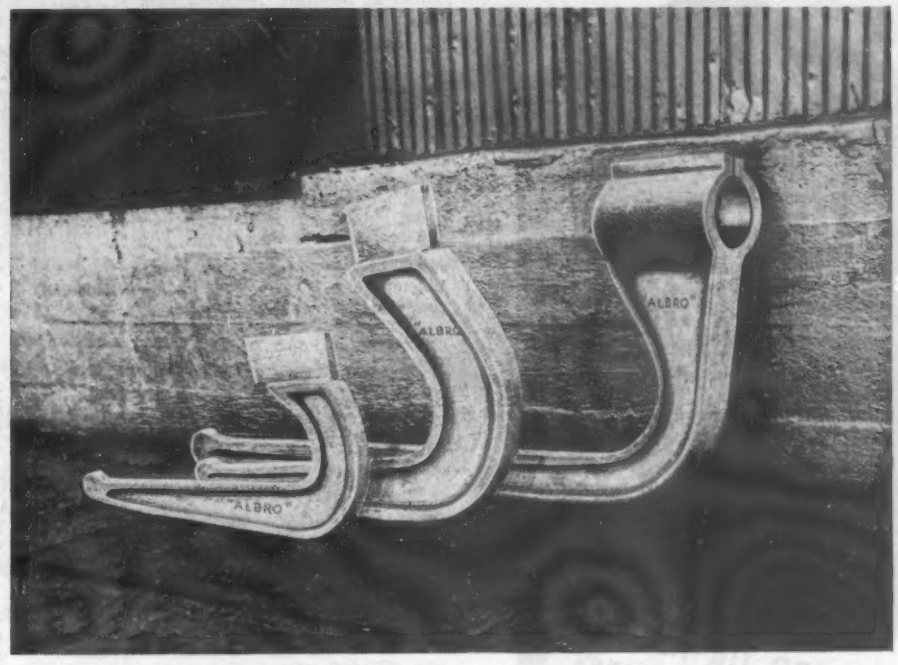
MACHINE MANUFACTURING COMPANY

PITTSBURGH, PA.

Hair Pin Hooks

•

for Pickling Coils



ALBRO METAL

We make them in all sizes of our "Albro" Acid Resisting Metal —The same metal as our time-proven "Albro" Die Cast Acid Resisting Chain.

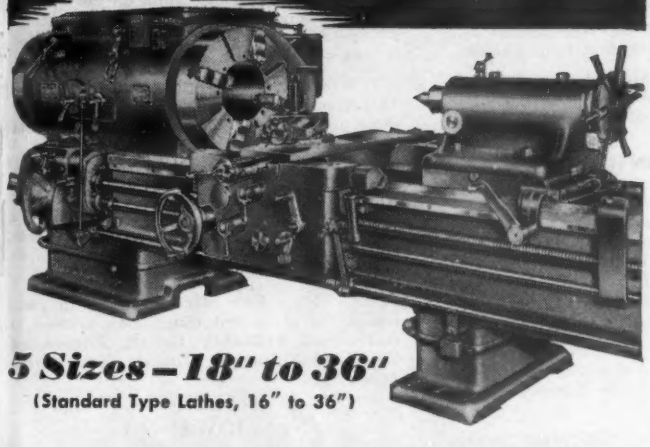
BRONZE DIE CASTING COMPANY

For Pickling—Chains—Hooks—Clevises—Bolts—Crates

Franklin Street at Ohio River Phone, CEdar 5987-8 N. S. Pittsburgh 12, Pa.

HYDRATROL LATHES

Large Hollow Spindle Type



5 Sizes—18" to 36"

(Standard Type Lathes, 16" to 36")

FOR FASTER PRODUCTION • BETTER WORK • LOWER COSTS!

Lehmann MACHINE CO.

CHOUTEAU AT GRAND ★ ST. LOUIS 3

SAVE 50% or MORE on TUBE-CUTTING!

Do you want a production rate of 600 to 800 pieces or more per hour? Specialists have built this high-speed new patented *tube-shearing* machine particularly to lower production costs. Handles 1½" to 6" O.D. light and medium wall tubing, certain plastic tubing, and a range of standard wall pipe. Write now for complete information, advising tube sizes you cut.

PRATT-ROOP CO.

Engineers and Manufacturers

Ky. Home Life Bldg. Louisville 2, Ky.

Get in Touch with
WELLMAN
FOR ALUMINUM
(HEAT-TREATED)
BRONZE OR
MAGNESIUM
CASTINGS

WOOD OR METAL
PATTERNS

In addition to their high quality and accuracy, Wellman aluminum and magnesium sand castings offer important plus advantages for your future products.

Our 35 years' experience (15 years' in Magnesium) and modern laboratory, foundry and pattern shop facilities are among the important reasons why we believe we can work advantageously with your company.

Phone, wire or write and we shall be glad to supply further information and quote on your casting and pattern requirements.

THE WELLMAN BRONZE & ALUMINUM COMPANY
GENERAL OFFICES
2539 EAST 93rd STREET
CLEVELAND 4, OHIO

WELLMAN
Means WELL-CAST

facture farm machinery and equipment, by James L. Bowman, 18 South Park St., Pontiac, Mich.

DETROIT—Metallurgical Products Corp., 423 Ford Bldg., has been incorporated with $100,000 capital to produce alloys, hardeners and castings, by P. M. Mattison, 18309 Prairie Ave.

DETROIT—James Hennecke & Associates Inc., 1635 East Grand Blvd., has been incorporated with $100,000 capital to manufacture metal products, by James Hennecke, same address.

DETROIT—Falls Spring & Wire Corp., 8635 Conant Rd., has let contract to Krieghoff Co., 6661 French Rd., for a brick and concrete plant building to cost about $100,000. C. W. Brandt, 112 Madison Ave., is architect.

MIDLAND, MICH.—Dow Chemical Co., Midland, has let contract to Austin Co., 429 Curtis Bldg., Detroit, for design and construction of a two-story 240 x 300-foot plastics plant warehouse, estimated to cost about $2,500,000.

NILES, MICH.—C.S.K. Machine Products Inc., 1549 Lake St., has been incorporated with $20,000 capital to manufacture castings, implements, tools and machinery, by Sam Garda, 132 Fremont St., Elkhart, Ind.

ROYAL OAK, MICH.—R & M Mfg. Corp., 410 East Fifth St., has been incorporated with $50,000 capital to manufacture tools, dies, gages, jigs and fixtures, by Thomas L. Telford, 3486 Baldwin Ave., Detroit.

ROYAL OAK, MICH.—Electro Plating Service Inc., 132 North Blair St., has been incorporated with $50,000 capital to do heat treating of metals, by G. Burgess, same address.

ILLINOIS

CHICAGO—Sherwin-Williams Co., East 115th St. and Cottage Grove Ave., will let contract soon for a one-story 75 x 125-foot power plant with coal and ash handling equipment. Garden & Erikson, 104 South Michigan Ave., are architects. Structural steel to Hansel-Elcock Co., 485 West 23rd Place.

CICERO, ILL.—Ceco Steel Products Co., 1926 South Laramie Ave., will build a one-story plant addition 80 x 325 and 260 x 325 feet, estimated to cost about $300,000.

MARYLAND

BALTIMORE—Locke Insulator Co., Charles and Cromwell Sts., has let contract to Leimbach & Williams, 30 West Biddle St., for a two-story 80 x 100-foot shop addition.

CUMBERLAND, MD.—Air Reduction Co. Inc., 60 East 42nd St., New York, plans chemical plant here, to cost about $150,000.

WISCONSIN

MILWAUKEE—Century Foundry & Engineering Co., town of Greenfield, has been incorporated with 250 shares of $100 par value to manufacture iron, steel and metal products by Frank J. Balcerzack, 207 East Michigan St., Milwaukee 2.

NEW BUTLER, WIS.—Butler Tool & Engineering Co. has been incorporated with 500 shares of $100 par value to manufacture tools, dies and engines, by Leonard Liebel and associates.

NEW RICHMOND, WIS.—City plans 75,000-gallon elevated steel water storage tank on 100-foot tower. Banister Engineering Co., 1547 University Ave., St. Paul, is engineer.

WAUWATOSA, WIS.—S-B Mfg. Co., 24 East Erie St., Milwaukee 2, will build a one-story 122 x 282-foot plant and office costing about $55,000. A. H. Bauer, 759 North Milwaukee St., Milwaukee 2, is architect.

KANSAS

HUTCHINSON, KANS.—Eaton Metal Products Co., Omaha, Nebr., manufacturer of tanks, heaters, etc., has let contract for a one-story tank factory 60 x 100 feet.

KANSAS CITY, KANS.—Westside Machine Works will let contracts soon for a one-story machine shop on Fairfax Road, to cost about $75,000.

ARKANSAS

LITTLE ROCK, ARK.—Minnesota Mining & Mfg. Co., St. Paul, manufacturer of abrasives, will build a new plant here for manufacture of roofing granules, to cost about $1,500,000. Company has bought 100 acres of quarry land to supply material.

OKLAHOMA

OKLAHOMA CITY, OKLA.—Boardman Steel Products Co. has let contract to Lippert Bros. Construction Co. for a one-story plant 120 x 175 feet.

MISSOURI

KANSAS CITY, MO.—Line Material Co., South Milwaukee, Wis., manufacturer of electric utility equipment, has let contract to Hiram Elliott Construction Co., Kansas City, for a one-story plant 265 x 440 feet.

SPRINGFIELD, MO.—Burns & McDonnell Engineering Co., 107 West Linwood Ave., Kansas City, Mo., has recommended new power plant for the city utilities at immediate cost of $4,690,000, including two 15,000 kw turbogenerators, surface condensers, feed water heater and treatment equipment, coal and ash-handling equipment and other equipment. Third turbogenerator is recommended for installation in 1955 at cost of $1,818,000. A. C. Kirkwood and Victor Whiteside are engineers.

ST. JOSEPH, MO.—Walker Mfg. & Sales Co., manufacturer of draft regulators, etc., plans a two-story plant addition 70 x 125 feet.

ST. LOUIS—Fred Medart Mfg. Co., 3525 DeKalb St., will let contract soon for an addition to building No. 5, to cost over $40,000. N. J. Campbell, 911 Locust St., is engineer.

TEXAS

BEAUMONT, TEX.—Standard Brass & Mfg. Co. has let contract to H. B. Neild, Beaumont, for a plant building to cost about $68,000.

CORPUS CHRISTI, TEX.—Tennessee Gas & Transmission Co. has applied to Federal Power commission for authority to construct 95 miles of 16-inch natural gas pipe line at cost of more than $2 million.

FORT WORTH, TEX.—John Muller Co., 312 Throckmorton St., will rebuild its machine shop and parts building, at cost of about $100,000.

GARLAND, TEX.—Engineering Laboratories Inc., W. G. Green, president, 624 East Fourth St., Tulsa, Okla., will build a $100,000 plant here for manufacture of aircraft and geophysic parts and will make alterations to plant in Tulsa.

JASPER, TEX.—City plans additions to electric power plant and distribution system, to cost about $175,000. Garrett Engineering Co., 1806 Milam St., Houston, Tex., is engineer.

IOWA

FORT DODGE, IOWA—Horn Mfg. Co. has let contract to C. G. Walker, Fort Dodge, for a plant building estimated to cost about $200,000. F. Griffith, Fort Dodge, is architect.

WASHINGTON

TACOMA, WASH.—City has appropriated $130,000 for construction of three 3000-kva substations and purchase of one 3000 kva transformer.

FLASH!

RINKOLIN

IS NOW AVAILABLE

We are happy to announce to old and new friends that America's No. 1 Wrinkle Finish is released for all uses. RINKOLIN is the fool-proof wrinkle finish which needs no special handling to get uniform results.—RINKOLIN always comes out with the same uniform texture and sheen.

STANDARD VARNISH WORKS

2600 RICHMOND TERRACE
STATEN ISLAND, N. Y.

2600 FEDERAL STREET
CHICAGO, ILLINOIS

SINCE 1870

For 40 Years

A Dependable Source For Parts Like These

SPRINGS STAMPINGS WIRE FORMS

Send in your specifications or prints for quotations

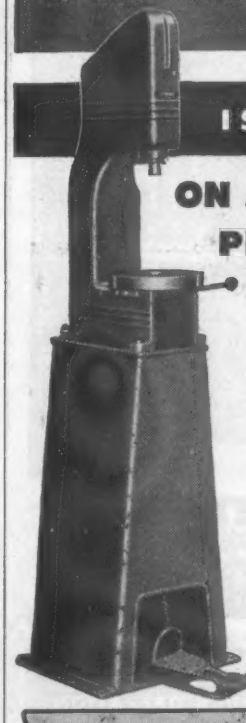
M. D. HUBBARD SPRING COMPANY

425 CENTRAL AVENUE • PONTIAC 12, MICHIGAN

CONTROLLED PRESSURE

IS IMPORTANT!..

ON ALL "ONE AT A TIME" PRESS OPERATIONS



because:

1. Fragile parts breakage eliminated.
2. Operations uniform once pressure is set.
3. Stops rejections due to irregular pressure.
4. Operator simply inserts work — presses control — removes part.
5. No "breaking-in" for inexperienced help.
6. No production lag due to operator fatigue.

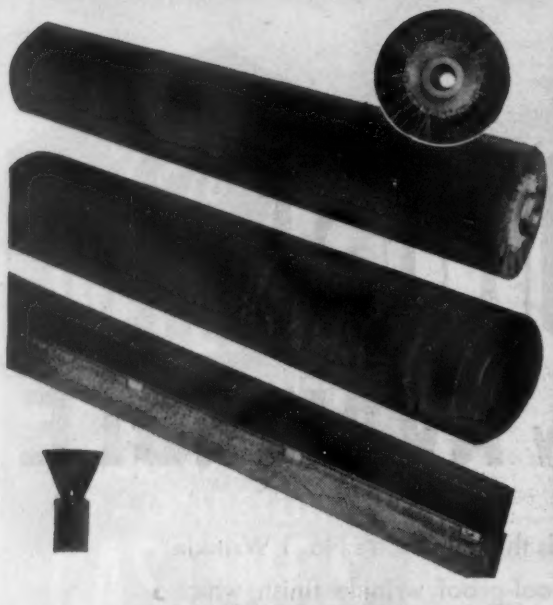
Air-Hydraulic presses, with *Controlled Pressure*, give *Efficient, Economical* and *Dependable* performance.

FOR COMPLETE DETAILS—WRITE

AIR-HYDRAULICS

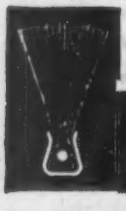
DIVISION BEYER MACHINE COMPANY

JACKSON, MICHIGAN



FULLERGRIP *Spiraled* BRUSHES

as well as Horizontal Brush Strips are used on Scrubbing machines, or to remove foreig material from sheet or strip metal; used on continuous sheet scrubbers, galvanizin and bran removal operations.



THE FULLER BRUSH COMPANY
INDUSTRIAL DIVISION, 3582 MAIN STREET, HARTFORD 2, CONN.

Re-power YOUR TRUCKS *with* READY-POWER

THE GAS-ELECTRIC POWER PLANT FOR ELECTRIC TRUCK OPERATION

THE READY-POWER CO.

3842 Grand River Avenue, Detroit 8, Mich.

"HERCULES" (Red Strand) Wire Rope supplies the Durability, Strength, Adaptability, Flexibility *and* Endurance that "tough jobs in every field" demand. It has been the "Life Line of Steel" for thousands of Plants, Mines, Construction Projects and other operations for over half a century! Yes, wherever wire rope is required for heavy duty, there's a "HERCULES" (Red Strand) type that will fit the job perfectly!

We Invite Your Inquiry.

A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS 12, MISSOURI U.S.A.

NEW YORK • CHICAGO
DENVER

PORTLAND • SEATTLE
SAN FRANCISCO

SURF-CHEK

KEEPS YOUR PRODUCTION IN LINE!

CONTROL OF SURFACE QUALITY—Stepped-Up production... Increased Efficiency... Reduced Rejects-These are the results that can and ARE being realized EVERY DAY through the adoption of the Surf-Chek method of Designation and Quality Control.

● DESIGNATES MACHINE FINISH — Kit includes 60-page instructional text and molded plastic Surf-Chek Roughness Standard replicas of 20 surfaces, 5 to 500 microinches. Turning, grinding, milling, honing, lapping and polishing can now be definitely controlled. Thousands in use. For further data, address Dept. S.

SURFACE CHECKING GAGE CO.
★ Hollywood 28, California ★

AGENTS AUSTRALIA . . . . . Paul & Gray, Ltd., Sydney
CANADA . . . Prenco Progress & Engineering Corpn., Toronto

KELLY HOSE COUPLINGS

TROJON AIR HOSE COUPLINGS
MALLEABLE IRON—RUST-PROOF

UNIVERSAL TYPE—Locking heads of all styles and sizes interchangeable from ¼" to 1".
QUICK-ACTION—Instantly connected or disconnected with one quarter turn.
TIME TESTED—DEPENDABLE. Manufacturer of these couplings since 1921.

Write for Catalogue No. 112

DISTRIBUTORS IN MOST PRINCIPAL CITIES

KELLY
CHICAGO
MACHINERY COMPANY
HOSE COUPLING DIVISION
2524 W. MADISON ST. CHICAGO 12

20th CENTURY BLAST PEENING SHOT

● Outstanding QUALITY and UNIFORMITY
●
CLOSER SCREENED by actual Rotap Tests!

Have you tried our STEEL SHOT AND GRIT for blast cleaning?

● *Amazingly effective—gets the job cleaned faster and more uniformly at lower cost for labor and abrasive.*

Our Exclusive Scientific Heat Treating makes 20th Century Blast so hard, so tough that you can depend on it to hold to its size range longer. This is important because there is a size of blast cleaning abrasive that is just right for your work and the slower it wears, the better your results. All Sizes—Graded to the New S.A.E. Specifications.

• • • • IMMEDIATE SHIPMENT • • • •

Write for Samples and Price List.

20th CENTURY BLAST · SHOT · GRIT

The Cleveland Metal Abrasive Co.

Main Office and Plant:
880 E. 67th Street, CLEVELAND 8, OHIO
Howell Works: Howell, Mich.

RYERSON STEELS in Stock

Thousands of kinds, shapes and sizes of steel in stock at eleven plants. Call Ryerson first for prompt action on steel.

Joseph T. Ryerson & Son, Inc.
Chicago, Milwaukee, St. Louis, Detroit, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Boston, Buffalo, New York.

BELMONT IRON WORKS
PHILADELPHIA · NEW YORK · EDDYSTONE
Engineers - Contractors - Exporters
STRUCTURAL STEEL — BUILDINGS & BRIDGES
RIVETED — ARC WELDED
BELMONT INTERLOCKING CHANNEL FLOOR
Write for Catalogue
Main Office—Phila., Pa. New York Office—44 Whitehall St.

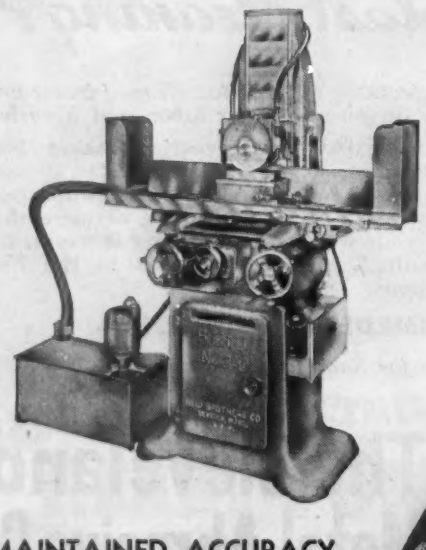
Steel Makers Since 1871
STRIP STEEL
STANLEY
Hot Rolled–Cold Rolled
Special Carbon–Alloys
The STANLEY WORKS
New Britain, Bridgeport, Conn. — Hamilton, Ont.

IMMEDIATE DELIVERY
ALLOY and CARBON GRADES
AS ROLLED, ANNEALED and HEAT TREATED
MACHINERY STEELS
COLD FINISHED and HOT ROLLED
•
TOOL STEELS
HIGH SPEED and CARBON GRADES
DRILL ROD—TOOL BITS—FLAT GROUND STOCK
SPECIAL PLATES—FLAME CUTTING
BROACH TYPE HACK SAWS
•
BENEDICT-MILLER, INC.
N. J. Phone: MArket 3-0400 • N. Y. Phone: REctor 2-2732
216 CLIFFORD ST., NEWARK 5, N. J.
FINE STEEL

STEEL from STOCK
Full Warehouse Service
BARS • STRUCTURALS
PLATES • SHEETS
COLD FINISHED • ETC.
Write for Monthly Stock List
AMERICAN PETROMETAL CORP.
Broadway at 11th St., Long Island City 2, N. Y.

QUALITY STEELS
TOOL STEELS — TOOL STEEL TUBING — DRILL ROD
FINE SPRING STEELS—BAND SAW STEELS
STEEL CONVEYOR BELTING STEEL SPECIALTIES
SANDVIK STEEL, INC.
NEW YORK — CLEVELAND — CHICAGO — LOS ANGELES

REID *Precision*
SURFACE GRINDER



EQUIPPED FOR WET GRINDING

MAINTAINED ACCURACY WITH ECONOMY

SEND FOR CATALOG AND PRICE LIST TODAY.

REID BROTHERS CO INC.
BEVERLY · MASSACHUSETTS

INGOT MOLDS and STOOLS

Plants:
SHARPSVILLE, PENNA.
NEVILLE ISLAND, PENNA.

S M P Co.

SHENANGO-PENN MOLD COMPANY
OLIVER BLDG., PITTSBURGH, PENNA.

Moves More Air Per Dollar Invested!

The improved BURT Monovent incorporates the most efficient design, combined with the simplest and most rigid structure ever built into a continuous ridge ventilator. Its new construction provides greater stability in high winds, new ease of erection and high air-moving ability. BURT Monovent is particularly efficient for steel mills and foundries where heat and smoke must be removed over large areas. New catalog and data sheets are now ready. Write for a set—today.

BURT MONOVENT Continuous Ridge Ventilator

30" to 96" Industrial Sizes

THE BURT MFG. CO.

ROOF VENTILATORS • OIL FILTERS
EXHAUST HEADS

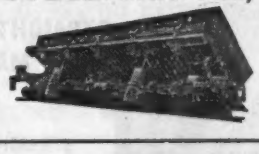
400 So. High St., Akron 11, Ohio

SEND FOR CATALOGS

Burt Engineers are glad to help on plans

DIFFERENTIAL

STEEL CAR CO., FINDLAY, OHIO



Air Dump Cars, Mine Cars, Locomotives, Lorries
AXLESS Trains and Complete Haulage Systems

GASOLINE – DIESEL

OHIO LOCOMOTIVE CRANES

STEAM – ELECTRIC

The OHIO LOCOMOTIVE CRANE Co. BUCYRUS OHIO

GEARS

for every Purpose

Bring your gear problems to Simonds. Quality gears of cast and forged steel, gray iron, bronze, silent steel, rawhide and bakelite. Gears of different types are produced. Spur gears up to 12 feet in diameter. Distributors of Ramsey Silent Chain drives and couplings.

THE SIMONDS GEAR & MFG. CO.

25TH STREET, PITTSBURGH, PA.

CUT GEARS

All Types and Sizes

Baldwin Roller Chain and Sprockets

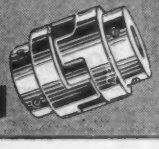
Heat Treated Alloy Steel Gears to Customer's Specifications

Special Gears and Special Gear Units

PITTSBURGH GEAR & MACHINE CO.

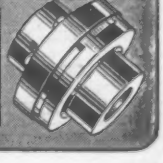
2680-2700 Smallman St., Pittsburgh, Pa.

L-R FLEXIBLE COUPLINGS



A complete line of non-lubricated flexible couplings—a size and type for practically every purpose. Sales offices in principal industrial centers. (See Classified Directory) or write main office and factory for engineering data and catalog.

LOVEJOY FLEXIBLE COUPLING CO., 5071 West Lake St., Chicago 44, Ill.



THE WILL AND THE STRENGTH TO WIN!

TO HAVE AND TO HOLD U.S. WAR BONDS

ATLAS DROP FORGINGS FOR WAR

ATLAS DROP FORGE COMPANY • LANSING 2, MICHIGAN

STAMPINGS
Over 40 years experience.
Literature on request
WHITEHEAD STAMPING CO.
Est. 1903
1857 W. Lafayette Blvd. Detroit 16, Michigan

WANTED—A PRODUCT OR A BUSINESS

A leading precision tool manufacturer with a national sales and service organization wants to acquire the manufacturing and selling rights for one or more products having potentially large unit sales to a broad industrial market or the consuming public. The product should be rapidly perishable, or it may be durable although requiring and utilizing a replaceable perishable accessory (obvious examples, a razor with a perishable blade or a tapping machine using perishable taps).

Serious consideration will be given to the purchase of the business and factory if necessary to secure such products.

This is an unusual opportunity for an inventor, or a manufacturer who desires to avoid today's operation problems.

Address Box 326, STEEL, Penton Bldg., Cleveland 13, O.

Member Metal Treating Institute
PITTSBURGH COMMERCIAL HEAT TREATING CO.
49TH ST. & A.V.R.R. PITTSBURGH, PA.
COMPLETE HEAT TREATING FACILITIES for Ferrous and Nonferrous Metals

LADLE SLEEVES • NOZZLES
FOUNDRY GATES • RUNNERS
(Longer Lengths)
Clay Manufacturers Since 1889
Also other Refractories
NATIONAL FIREPROOFING CORPORATION
PITTSBURGH 12, PA.

HENDRICK
PERFORATED METALS
Hendrick follows your instructions accurately, whether for a simple machine guard, or an intricate small-hole punching in stainless steel, or other corrosion resisting material.
HENDRICK MANUFACTURING CO.
37 Dundaff Street Carbondale, Pa.
Sales Offices in Principal Cities
Please Consult Telephone Directory
Manufacturers of Mitco Open Steel Flooring; Elevator Buckets; Light and Heavy Steel Plate Construction

TAYLOR-WILSON
STRAIGHTENING MACHINE
for
STRAIGHTENING
SIZING
BURNISHING
For Round Bars and Tubing
Faster production, constant accuracy.
TAYLOR-WILSON MFG CO.
15 Thomson Ave., McKees Rocks, Pa.
PITTSBURGH DISTRICT

MEET THE BOYS who buy and sell good used or surplus machinery
You'll find them all in STEEL'S "Used and Rebuilt Equipment" section, week after week.
Your advertisement will reach them, too. Rates are very reasonable . . . . write today to
STEEL, Penton Building, Cleveland 13, Ohio

EQUIPMENT . . . MATERIALS

GOVERNMENT TERMINATED SURPLUS LOT M-124

SERVICEABLE MATERIALS

Steel procured for Caterpillar Tractors consisting of:

Bars, Plates and Strips—Flats and Rounds—Hot Rolled, Cold Rolled, etc.

Sale by competitive sealed bidding

Terms of sale—"as is" f.o.b. cars or trucks, ACF Plant, Berwick, Pennsylvania

Bids will be opened at 2:00 p.m., December 13, 1945

Material available for inspection daily

Bids and inquiries should be directed to

MR. G. E. THOMPSON

AMERICAN CAR AND FOUNDRY COMPANY

Berwick 6, Pennsylvania

Telephone Berwick 1144

GOVERNMENT TERMINATED SURPLUS LOTS M-122-123

SERVICEABLE MATERIALS

Automotive Materials procured for Caterpillar Tractors consisting of:

Finished and incomplete Spring Clips, Washers, Wrenches, Grease Guns, Jars, Collars, Bushings, Rough Iron and Steel Castings and Forgings, etc.

Sale by competitive sealed bidding

Terms of sale—"as is" f.o.b. cars or trucks, ACF Plant, Berwick, Pennsylvania

Bids will be opened at 10:00 a.m., December 13, 1945

Material available for inspection daily

Bids and inquiries should be directed to

MR. G. E. THOMPSON

AMERICAN CAR AND FOUNDRY COMPANY

Berwick 6, Pennsylvania

Telephone Berwick 1144

FOR SALE

LOT 186—41

The following surplus Government-Owned equipment used in the production of Caterpillar Tractors for the Corps of Engineers, U. S. Army:

Dies, Jigs, Fixtures and Gages

totalling approximately

750 gross tons Steel

60 " " Cast Iron

768 pounds Aluminum

MATERIAL LOCATION

American Car and Foundry Company
Berwick, Pennsylvania

Sale by Sealed Bids on scrap or salvage basis to be opened at our Berwick, Pennsylvania, plant at

2 p.m., December 12, 1945

Inspection 9 a.m. to 4 p.m., November 29 to December 11, except Saturday and Sunday.

Invitation to bid and full information on this Lot 186–41 can be secured from

MR. G. E. THOMPSON

AMERICAN CAR AND FOUNDRY COMPANY

Berwick 6, Pennsylvania

Telephone Berwick 1144

We BUY and SELL

New Surplus Pipe and Tubes
Steel Buildings
Tanks
Valves and Fittings
Plates, Bars and Structural Steel

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards, St. Clair County, Ill.

BLOWERS--FANS EXHAUSTERS

"Lungs for Industry"

REBUILT and GUARANTEED

Prompt Shipments from a Large Stock
All Types — All Makes — All Sizes
And We Really Rebuild 'Em.

General Blower Co.

CHICAGO, ILL.
514 N. Dearborn St.

MORTON GROVE, ILL.
8604 Ferris Ave.

RAILS NEW AND RELAYING

TRACK ACCESSORIES

from **5** *Warehouses*

- PROMPT SHIPMENTS
- FABRICATING FACILITIES
- TRACKAGE SPECIALISTS

EVERYTHING FROM ONE SOURCE

L. B. FOSTER COMPANY

PITTSBURGH CHICAGO
NEW YORK SAN FRANCISCO

FOR SALE

SULLIVAN AIR COMPRESSOR

Class WN 4—2 stage 3000 CFM, 125 lbs. pressure. Good as new. Purchased new, 1942.

BENKART STEEL & SUPPLY CO.
2017 Preble Ave. Pittsburgh 12, Pa.
CEdar 4440

FOR SALE

ALLOY STEEL

ROUND, HEX, SQUARE BARS

New York and Pittsburgh Warehouse Stocks

L. B. FOSTER CO.

9 Park Place, New York 7
Phone—Barclay 7-2111
P. O. Box 1647, Pittsburgh 30
Phone—Walnut 3100
Michigan Distributor
C. J. GLASGOW COMPANY
2009 Fenkell Ave., Detroit 3
Phone—Townsend 8-1172

RELAYING RAILS

(MACHINED STRAIGHTENED)

and accessories

Immediate Shipment

MIDWEST STEEL CORPORATION
CHARLESTON WEST VIRGINIA

FOR SALE

2 — Metal Alligator Shears

Address Box 335
STEEL, Penton Bldg., Cleveland 13, O.

HAMMERS, 3-B & 4-B Nazel M.D.
LATHE, Turret 24" Gisholt, 6-1/4" hole.
PRESS, Forging 1000 ton United Steam-Hyd.
PLANER, O.S. 60" x 60" x 14'. D&H M.D.
SHAPER, 36" Morton Draw Cut.
SHEARS, Alligator 1"—4"
SHEAR, Open End 22" blades 2-1/2" sq. M.D.
SLOTTER, 12" Putnam, 35" table, B.D.
STRAIGHTENER PLATE, 110" x 1-1/4" H&J.
STRAIGHTENER, 42" W-F, 11 roll, 2-5/8" dia.

WEST PENN MACHINERY COMPANY
1208 House Bldg. Pittsburgh 22, Pa.

DULIEN Buys
DULIEN Sells
DULIEN Liquidates

Rail, Accessories
Railway Equipment
All Steel Products

DSP INC. ORGANIZATIONS

DULIEN STEEL PRODUCTS, Inc.
OF WASHINGTON — OF NEW YORK

RAILWAY EQUIPMENT AND ACCESSORIES

We can furnish rails, spikes, bolts, angle bars, locomotives, cranes and other railway material.

Write, wire or phone for prices

SONKEN-GALAMBA CORP.
108 N. 2d St. Kansas City, Kansas

EQUIPMENT... MATERIALS

STEEL SHORTS WANTED

22 gauge, multiples of 2-3/4" x 48", 20 gauge, multiples 6-3/4" x 48" and 23 x 48. Mill run, cold rolled or hot rolled pickled. No dings or dents.

GENERAL FABRICATORS
2037 West 14th St., Cleveland 13, O.
MAin 1160

WANTED TO PURCHASE
10,000 pounds Angle Iron 1-3/4 x 1-3/4 x 5/16—STRAIGHT SHORT BARS ACCEPTED.
20—16 ft. length Tubing, 3-3/4 O.D. x 10, 11 or 12 gauge wall.
John Elwin Steel Products Co.
P. O. Box 177, Hoquiam, Wash.

WANTED
STRUCTURAL STEEL—BARS
BAR SHAPES—SHEETS
WAYNE SURPLUS STEEL CO.
P. O. Box 734 Fort Wayne, Ind.

SELLERS — BUYERS — TRADERS
More for your Dollar! **IRON & STEEL PRODUCTS INC.** 40 Years' Experience
13462 S. Brainard Ave.
Chicago 33, Illinois
"Anything containing IRON or STEEL"

ROLLING MILLS and EQUIPMENT
FRANK B. FOSTER
829 OLIVER BLDG. PITTSBURGH, PA.
Cable Address FOSTER Pittsburgh

CLASSIFIED

Help Wanted

DRAFTSMEN

Large steel company in Pittsburgh area has several opportunities for draftsmen with high school or college education and experience in the following areas: design of steel mill and steel foundry products; railroad track accessories; layout and design of steel mills, blast furnaces, open hearth furnaces, and power plants; design of fabricated concrete bars; layout of electric power and control equipment; general mechanical design and layout. Please submit details, statement of experience and education, inexpensive photograph, and required minimum earnings. Address Box 142, STEEL, Penton Bldg., Cleveland 13, O.

SALES MANAGER

With successful sales record by one of the leading manufacturers in the metal cutting tool industry. State age, education, experience, special qualifications and compensation desired. Address Box 311, STEEL, Penton Bldg., Cleveland 13, O.

CONSTRUCTION SUPERINTENDENT

Prefer college graduate civil engineer; 10 to 15 years experience all types of building construction, both steel and concrete. Must be capable of planning work from drawings and coordinating various crafts during construction.

Write Personnel Department, P. O. Box 2632, Birmingham, Ala.

WANTED: SALES ENGINEER FOR MEDIUM SIZED STEEL FABRICATING PLANT LOCATED IN SOUTHERN CALIFORNIA. MUST HAVE THOROUGH KNOWLEDGE IN THE SELLING OF LARGE VOLUME OF PRESSURE VESSELS: ALSO OTHER TANKS OF VARIOUS SIZES AND DESIGNS. GIVE COMPLETE PERSONAL AND EXPERIENCE RECORDS. INDICATE SALARY DESIRED. ADDRESS BOX 307, STEEL, PENTON BLDG., CLEVELAND 13, O.

WANTED: SALESMAN BY LARGE TUBING manufacturer of both seamless and welded in carbon, alloy and stainless steels. Must have Mechanical or Metallurgical Engineering college degree, or suitable alloy steel field sales experience. Give full details with application. Write Box 265, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: MANAGER FOR CONSTRUCTION Division to take full charge. Executive with ability to organize and get results. Must be experienced with oil refineries, chemical, steel construction, etc. Write stating age, education, experience, references and salary expected. Address Box 323, STEEL, Penton Bldg., Cleveland 13, O.

Help Wanted

Help Wanted

WANTED
DESIGNERS AND DRAFTSMEN

Familiar with design of rolling mills and auxiliary equipment for steel mills. Good opportunities. All replies confidential.

REYNOLDS METALS COMPANY
Engineering Building
5th and Cary Streets, Richmond, Virginia

DRAFTSMEN

Established company in Cleveland has several good openings for men experienced in the mechanical, electrical, structural and piping fields.

Address Box 333
STEEL, Penton Bldg., Cleveland 13, O.

PLANT SUPERINTENDENT WANTED FOR MEDIUM SIZED STEEL FABRICATING PLANT LOCATED IN SOUTHERN CALIFORNIA, WITH A GOING CONCERN. APPLICANT MUST HAVE EXPERIENCE IN LARGE VOLUME PRODUCTION OF PRESSURE VESSELS AND OTHER TANKS OF VARIOUS SIZES AND WEIGHTS: AND ALSO A THOROUGH KNOWLEDGE OF STEEL PLATE FABRICATION. GIVE COMPLETE PERSONAL AND EXPERIENCE RECORDS. INDICATE SALARY DESIRED. ADDRESS BOX 308, STEEL, PENTON BLDG., CLEVELAND 13, O.

WANTED: CHIEF ENGINEER. EXECUTIVE with ability to take full charge of all engineering, research and development. Must be familiar with oil refinery equipment and construction, general steel plate construction, and general process equipment. Location midwest. Write giving full information, age, education, experience, salary, references, etc. to Box 325, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: PRODUCTION MANAGER, DROP Forge Plant, familiar with scheduling, planning and production. Location East. Give full particulars, age, education, positions held, salaries earned, references, salary expected, enclose picture. Write Box 315, STEEL, Penton Bldg., Cleveland 13, O.

STRUCTURAL DRAFTSMEN WHO HAVE had experience in structural fabricating shops. Give complete experience and when available in first reply. Permanent position. Orleans Materials & Equip. Co., Inc., P. O. Box 87, New Orleans 6, La.

WANTED - ESTIMATOR

Competent estimator for ship work, structural steel and plate work. State experience and references. Excellent opportunity. Write M. S. Esslinger, Ingalls Shipbuilding Corporation, Pascagoula, Miss.

Accounts Wanted

MANUFACTURERS' AGENT WESTERN NEW YORK

Available in this territory to represent manufacturer of industrial or automotive equipment. Experienced chief engineer and executive with background and knowledge of sales, manufacture, design, materials, castings, forgings, engines and accessories, power transmissions and clutches, controls, instruments and lubrication, ready to open office. Address Box 329, STEEL, Penton Bldg., Cleveland 13, O.

Positions Wanted

PLANT MANAGER

General Manager medium sized plant, or works manager larger plant available. Experience includes overall plant management in heavy industry, product development and manufacture, market analysis, sales engineering, executive contact work. Best of references will demonstrate adaptability, industry and loyalty. Location immaterial. Address Box 328, STEEL, Penton Bldg., Cleveland 13, O.

CLASSIFIED

Opportunities

WILL BUY FOR CASH

A going industrial business located in Michigan, Ohio, Indiana or Illinois. Prefer transaction between $200,000 and $1,000,000 involving factory with products of large potential volume.
With your proposal which will be held confidential, please submit complete information including pictures of your factory and products. We are manufacturers who have operated our own factory for 30 years.

Principals only.

Address Box 331, STEEL, Penton Bldg., Cleveland 13, O.

WE WILL BUY

Mechanical or Electrical Inventions and New Products, but only if fully patented and with large volume possibilities. A working model must be available. All offerings will receive immediate and confidential consideration. No brokers, please.

ADDRESS BOX 332
STEEL, PENTON BLDG., CLEVELAND 13, O.

CONTRACT WORK

PRODUCTION CAPACITY AVAILABLE

UNIVERSAL TURRET LATHES AND ENGINE LATHES, both large and small. Maximum bar 4½", maximum chucking 36".

Also DRILLING, FLAME CUTTING, WELDING and GEAR CUTTING.

Manufacturers of chain sprockets. Modern equipment, excellent personnel. Catalog on request.

THE HOWE MFG. CO.
7500 Euclid Ave., Cleveland 3, O.
HEnderson 6620

SPECIAL MANUFACTURERS TO INDUSTRY... *Since 1905*

Metal Specialties comprised of STAMPINGS, FORMING, WELDING, SPINNING, MACHINING. All Metal or Combined with Non-Metal Materials

•

LARGE SCALE PRODUCTION
OR PARTS AND DEVELOPMENT ONLY

GERDING BROS.
SE THIRDVINE ST. • CINCINNATI 2, OHIO

Automatic and Hand Screw Machine Products
Up to 2¼ inches - Any Metal
Drilling and Lathe Work.
E. J. BASLER CO.
231 S. La Salle St., Chicago 4, Ill.
Plant—Chesterton, Ind.

McCulloch Mfg. Co.
Contracting Engineers
& General Machinists
200 Old Colony Ave.
South Boston 27, Mass.

Send your inquiries for
SPECIAL ENGINEERING WORK
to the
A. H. NILSON MACHINE COMPANY, BRIDGEPORT, CONN.
designers and builders of wire and ribbon stock forming machines.
We also solicit your bids for cam milling

Opportunities

SOUTH AFRICAN INDUSTRIAL SITE

Business organization with extremely valuable industrial site served by excellent rail siding facility situated off Johannesburg in Selby Industrial and Motortown area, within a mile of the City Hall, is prepared to accommodate one or more overseas engineering, motor trade or industrial enterprises in the centre of the World's greatest gold mining industry.

As ground values in this area range up to £100,000 per acre and as multi-story buildings are permissible on the site in an area which is the highly concentrated industrial center of the Witwatersrand's business and mining activity, only those organizations whose business would justify factory showrooms, workshops or offices so close to the center of the city should apply.

In return for the accommodation, an interest in the profits of the establishment in the form of Preference Shares is proposed, but consideration will be given to other proposals.

Applicants should give, in the first instance, preliminary details of nature of enterprise, anticipated prospects, type of buildings and total floorspace probably required, which information will be treated in strict confidence.

Address Box 317
STEEL, Penton Bldg., Cleveland 13, O.

Representatives Wanted

WANTED
MANUFACTURERS' AGENTS

To represent complete line of tool steels. Several good territories open.

Address Box 322
STEEL, Penton Bldg., Cleveland 13, O.

Employment Service

SALARIED POSITIONS $2,500-$25,000. RE-conversion is creating lifetime opportunities now. This thoroughly organized confidential service of 35 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated through a procedure individualized to each client's requirements. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details. R. W. BIXBY, INC., 110 Delward Bldg., Buffalo 2, N. Y.

ADVERTISING INDEX

A

Acme Aluminum Alloys, Inc. 186
Adams, R. P., Co., Inc. 20
Agaloy Tubing Co. 152
Air Reduction 169
Alliance Machine Co., The 6
Allied Products Corporation 25
Allis-Chalmers Mfg. Co. 8, 9
American Broach & Machine Co. 2
American Chain & Cable, Page Steel & Wire Division 176
American Chain & Cable, Wright Manufacturing Division 24
American Gas Association 47
American Machine & Gage Co., Walsh Press & Die Co. Division 23
American Magnesium Corporation 185
American Petrometal Corp. 218
American Screw Co. 42
American Society for Metals 192
American Society of Tool Engineers 57
Anaconda Wire & Cable Co. 171
Apex Machine & Tool Co., The 16
Atlas Car & Mfg. Co., The 184
Atlas Drop Forge Co. 220

B

Babcock & Wilcox Co., The 179
Baker Brothers, Inc. 170
Baker-Raulang Co., The 166
Basler, E. J., Co. 223
Bearings Company of America 73
Bedford Foundry & Machine Co. 211
Belmont Iron Works 218
Benedict-Miller, Inc. 218
Bethlehem Steel Co. 1
Beyer Machine Co., Air-Hydraulics Division 215
Birdsboro Steel Foundry & Machine Co. 56
Bissett Steel Co., The 210
Bixby, R. W., Inc. 223
Black Manufacturing Co., The 27
Blaw-Knox Co. 61
Blaw-Knox Division of Blaw-Knox Co. 61
Bohn Aluminum & Brass Corp. 40
Bridgeport Brass Co. 33, 34
Bronze Die Casting Co. 213
Buffalo Wire Works Co., Inc. 203
Bullard Co., The 98
Burt Manufacturing Co., The 219

C

Carpenter Steel Co., The 125
Chicago Screw Co., The 204
Chicago Tramrail Co. 161
Cleveland Cap Screw Co., The 54
Cleveland Crane & Engineering Co., The 127
Cleveland Metal Abrasive Co., The 217
Cleveland Tramrail Division, The Cleveland Crane & Engineering Co. 127
Cleveland Welding Co., The 37
Commercial Metals Treating, Inc. 211
Cone Automatic Machine Co., Inc. 93
Crane Co. 145
Crane Packing Co. 157
Crocker-Wheeler Division of Joshua Hendy Iron Works 159
Cullen-Friestedt Co. 208
Cuno Engineering Corporation 149
Cutler-Hammer, Inc. ..... Back Cover

D

Differential Steel Car Co. 219
Dow Chemical Co., The 132
Drop Forging Association 45
Dulien Steel Products, Inc. 221
Du Pont, E. I., de Nemours & Co., Inc. 167

E

Eastern Stainless Steel Corp. 109
Electric Controller & Mfg. Co., The 129
Electric Furnace Co., The 164
Electro Metallurgical Co. 44
Electro Refractories & Alloys Corp. 30
Erie Foundry Co. 187

F

Fairbanks, Morse & Co. 76
Fate-Root-Heath Co., The 63
Ferry Cap & Set Screw Co., The 12
Fitzsimons Co., The 51
Foster, Frank B. 222
Foster, L. B., Co. 221
Fuller Brush Co., The 216

G

General Blower Co. 221
General Electric Co. 35, 66
Gerding Bros. 223
Gisholt Machine Co. 21
Great Lakes Steel Corp. 17
Greenspon's Jos., Son Pipe Corp. 221

H

Hansen Mfg. Co., The 39
Harnischfeger Corporation 68
Harris Foundry & Machine Co. 151
Haynes Stellite Co. 72, 73
Hays Corporation, The 202
Hendrick Manufacturing Co. 220
Heppenstall Co. 191
Hobart Brothers Co. 210
Holden, A. F., Co., The ..... Front Cover
Hubbard, M. D., Spring Co. 215

I

Illinois Gear & Machine Co. 60
Ingalls Iron Works Co., The 180
Inland Steel Co. 81
Iron & Steel Products, Inc. 222

J

Jeffery Manufacturing Co., The 46
Johnson Gas Appliance Co. 182
Jones & Laughlin Steel Corp. 140, 141
Joyce Machine Co. 50

K

Kelly Machinery Co. 217
Kennametal, Inc. 143
Koppers Co., Inc. 55
Korfund Co., Inc., The 174

L

Ladish Drop Forge Co. 13
Laminated Shim Co., Inc. 200
Lebanon Steel Foundry 22
Lehmann Machine Co. 213
Lepel High Frequency Laboratories, Inc. 64
Leschen, A., & Sons Rope Co. 216
Lincoln Electric Co., The 28, 29
Lovejoy Flexible Coupling Co. 219

Mc

McCulloch Mfg. Co. 223
McQuay-Norris Manufacturing Co. 158

M

Macklin Co. 3
Mallory, P. R., & Co., Inc. 48
Manheim Manufacturing & Belting Co. 52
Master Electric Co., The 49
Mathews Conveyer Co. 178
Michiana Products Corp. 201
Michigan Steel Tube Products Co. 131
Midwest Steel Corp. 221
Monarch Steel Co. 51
Morgan Construction Co. 78

N

National Acme Co., The 32
National Fireproofing Corporation 220
National Steel Corporation 17
New Departure, Division of General Motors 7
Nilson, A. H., Machine Co. 223

O

Ohio Locomotive Crane Co., The 219

P

Page Steel & Wire Division, American Chain & Cable 176
Palmer-Shile Co. 206
Pangborn Corporation 172
Peninsular Grinding Wheel Co., The 18,
Pennsylvania Salt Manufacturing Co. .....
Pesco Products Co. .....
Philco Corp., Storage Battery Division .....
Phillips Screw Manufacturers .....
Phoenix Manufacturing Co. .....
Pittsburgh Commercial Heat Treating Co. .....
Pittsburgh Gear & Machine Co. .....
Plymouth Locomotive Works .....
Pratt-Roop Co. .....

R

Ready-Power Co., The .....
Reid-Avery Co., Inc., The .....
Reid Brothers Co., Inc. .....
Reliance Electric & Engineering Co. ..... Inside Front Cover
Remington Rand, Inc., Systems Division .....
Republic Steel Corporation 43,
Roosevelt Hotel .....
Roper, Geo. D., Corporation .....
Ross Heater & Mfg. Co., Inc. .....
Russell, Burdsall & Ward Bolt & Nut Co. .....
Ryerson, Joseph T., & Son, Inc. .....

S

Salem Engineering Co. .....
Sandvik Steel, Inc. .....
Shell Oil Co., Inc. .....
Shenango-Penn Mold Co. .....
Simonds Gear & Mfg. Co., The .....
Sinclair Refining Co. .....
Snyder Tool & Engineering Co. .....
Socony-Vacuum Oil Co., Inc. .....
Sonken-Galamba Corp. .....
Standard Varnish Works .....
Stanley Works, The .....
Steel Founders' Society .....
Steel Products Engineering Co., The .....
Stokerunit Corporation .....
Sturtevant, B. F., Co. 14,
Surface Checking Gage Co. .....
Surface Combustion Corporation 154,

T

Taylor-Wilson Mfg. Co. .....
Texas Co., The .....
Thomas Machine Manufacturing Co. .....
Thompson Grinder Co., Inc., The .....
Tide Water Associated Oil Co. 162,

U

Union Carbide & Carbon Corp. 44, 72,
United Autographic Register Co. .....
United Engineering & Foundry Co. .....
United States Steel Corp., Subsidiaries .....
United States Steel Supply Co. .....
United Tube Corporation of Ohio .....

V

Van Dorn Iron Works Co., The .....
Vickers, Inc. .....

W

Walker-Turner Co., Inc. .....
Walsh Press & Die Co. Division of American Machine & Gage Co. .....
Warner & Swasey Co. .....
Wean Engineering Co., Inc., The .....
Wellman Bronze & Aluminum Co., The .....
West Penn Machinery Co. .....
Whitehead Stamping Co. .....
Wilson, Lee, Engineering Co., Inc. ..... Inside Back Cover
Wolverine Tube Division Calumet & Hecla Consolidated Copper Co. .....
Worcester Pressed Steel Co. .....
Wright Manufacturing Division, American Chain & Cable .....
Wrigley, Wm., Jr. Co. .....

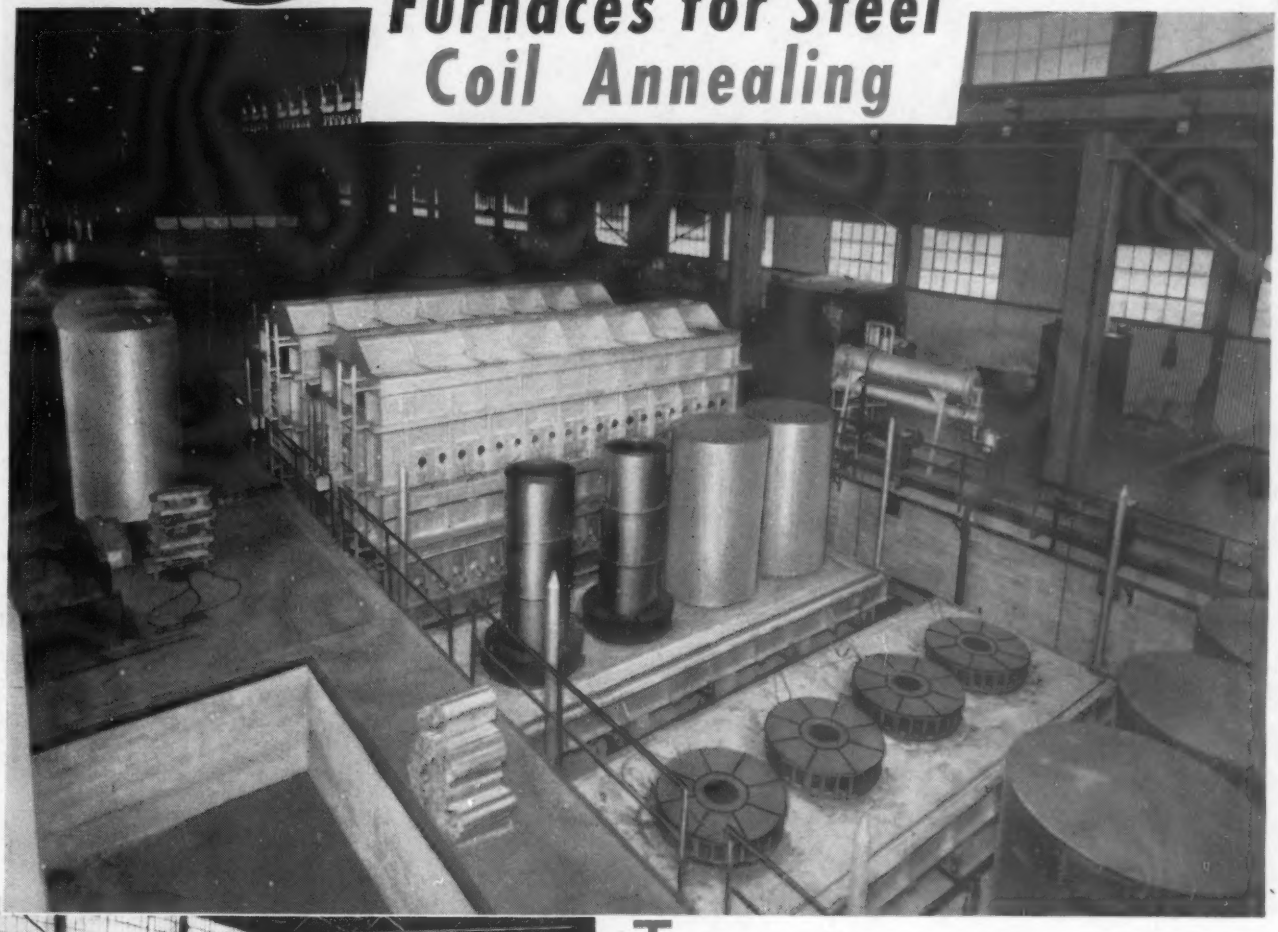
Y

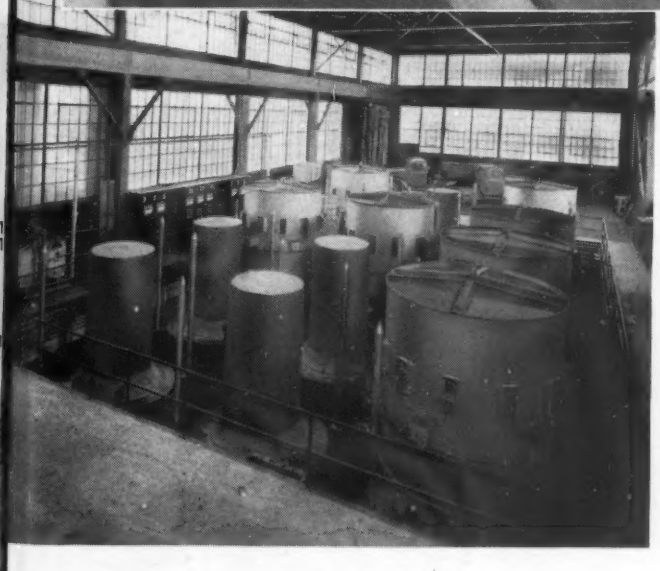
Youngstown Sheet & Tube Co., The .....

~ ~ ~

Table of Contents Page 77
Classified Advertisers, Pages 221, 222, 223

WILSON Rectangular and Cylindrical Bell Type Furnaces for Steel Coil Annealing





THE Lee Wilson Engineering Company is ready for the new expansion in the strip sheet and tin plate industry.

New developments in the use of radiant tube and convection heating will increase the tons per hour yield in annealing furnaces designed for larger coil diameters and increased piling heights.

The Wilson Annealing Unit is covered by Patents Nos. 1,952,402, 2,068,477, 2,078,356, 2,081,612, 2,089,843, and other patents pending.

ENGINEERED AND CONSTRUCTED BY THE

Lee Wilson ENGINEERING Co., Inc.

20005 West Lake Road CLEVELAND, OHIO

Telephone ACademy 4670

Sold by The WEAN ENGINEERING CO., Inc., Warren, Ohio

INDUSTRIAL FURNACES ★ RADIANT TUBE HEATING ★ HEAT TREATING PROCESSES

What industry needs today

Combining both motor control and safety switch in one compact unit, Cutler-Hammer Combination Starters solve many of the space problems which are met in relocating machines for today's widespread changes in production.

A new Cutler-Hammer Combination Starter can save h of time against moving, reconditioning, remounting, rewiring the separate motor control and safety switch u used before ... and usually costs less than saving the old units.

Cutler-Hammer Combination Starters not only bring the trouble-saving dependability of such famous features in the motor control as dust-safe vertical contacts and eutectic alloy overload protection but safety switches built to the same high standard of engineering excellence.

Reorganizing the production facilities of a factory is alway a race against time. Markets are calling. Workers are waiting. It is in this very situation today that alert executives and electrical supervisors are finding Cutler-Hammer Combination Starters a timely answer to some of their m pressing problems. On machines being relocated, the starters that combine *both* motor control and safety swit in *one* compact unit can save hours of time against movin reconditioning, remounting, and rewiring the separate motor control and safety switch units previously used. Being so compact, they solve many of the space problems met in relocating machines. Being *new* equipment, they save delays in resuming and maintaining production. And being Cutler-Hammer Combination Starters, they assu years of *completely* dependable performance as *both* safety switch and motor control are built to the same high standard of engineering excellence. Cutler-Hammer Combination Starters (Bulletin 9589) are available in a full range of sizes to meet *your* requirements and are carried in stock by recognized electrical wholesalers everywhere CUTLER-HAMMER, Inc., 1211 St. Paul Avenue, Milwaukee 1, Wisconsin. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto.

CUTLER-HAMMER
MOTOR CONTROL
C-H